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TECHNOLOGY AND TRADE STATISTICS: PART 1

STATISTIQUE DE LA TECHNOLOGIE ET DU COMMERCE: PREMIÈRE SECTION

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TECHNOLOGY AND TRADE STATISTICS: I

There are many reasons for international trade. A pattern of exports or imports of a product may be caused by a number of factors or combinations of factors, ranging from climatic and soil conditions, to traditional crafts, to government decree. One reason for the trade in certain products is their technological quality, or the quality of the technology necessary to produce them. These are the "high-tech" products which are receiving so much printer's ink these days.

A common definition of "high-tech" products does not exist. In 1984, two committees of the Organization for Economic Cooperation and Development (OECD) agreed that such products possessed five characteristics:

- high dependence on a strong technology base and a vigorous R&D effort;
- considerable strategic significance for governments;
- long lead-times from basic research to industrial application, short lead-times in commercialization, and accelerated obsolescence under the competitive pressure of new product and process introductions;
- high risks and large capital investments; and
- high degree of international co-operation and competition in R&D, production and worldwide marketing.[1]

1 "Trade in High Technology Products: An Initial Contribution to the Statistical Analysis of Trade Patterns in High Technology Products", DSTI/SPR/84.66, OECD, Paris, 30 January 1985, p. 5.

STATISTIQUE DE LA TECHNOLOGIE ET DU COMMERCE: PREMIERE SECTION

Le commerce international est influencé par de nombreux facteurs ou combinaisons de facteurs allant des conditions climatiques et édaphiques, en passant par les métiers artisanaux, jusqu'aux décrets officiels. Le commerce de certains produits dépend, entre autres, de leur qualité technique ou de la qualité de la technique nécessaire à leur fabrication. Il s'agit des produits de haute technologie dont on entend tellement parler à l'heure actuelle.

Il n'existe pas de définition commune de ces produits. En 1984 toutefois, deux comités de l'Organisation de coopération et de développement économique (OCDE) sont convenus que ces produits présentaient les cinq caractères suivants:

- nécessité d'une solide base technologique et d'un effort vigoureux de recherche;
- importance stratégique considérable pour les gouvernements;
- délais importants entre la recherche fondamentale et l'application industrielle, passage rapide à la commercialisation et l'obsolescence accélérée par suite de la concurrence résultant de l'introduction de nouveaux produits et de nouveaux procédés;
- risques et investissements élevés;
- coopération et concurrence internationales très développées pour la R-D, la production et la commercialisation à l'échelle mondiale.[1]

1 "Commerce des produits de haute technologie, Première contribution à l'analyse statistique des échanges de produits de haute technologie." DSTI/SPR/84.66, OCDE, Paris, 31 janvier 1985, p.5.

None of these suggested characteristics are easy to quantify and, so far, the R&D effort has been the basic criterion for selection. OECD statistics and analyses derived from this work will be presented in subsequent sections of this series.

Il n'est pas facile de quantifier aucun de ces caractères et, jusqu'à présent, le critère de base a été l'effort consacré à la R-D. Les statistiques et les analyses tirées du travail entrepris par l'OCDE seront présentées dans les sections ultérieures.

This section is based on an arrangement of commodities made in the Industry Branch of the Ministry of State for Science and Technology in 1981. No specific criteria were used; commodities were assigned to the selected classes according to the officers' best judgement. Commodities were, necessarily, selected from those for which international trade statistics were available.

La présente section repose sur une classification des marchandises effectuée en 1981 par la Direction industrielle du ministère d'État aux Sciences et à la Technologie. Aucun critère précis n'a été employé: les marchandises ont été réparties entre les diverses classes selon les connaissances des fonctionnaires. Ces marchandises ont nécessairement été choisies parmi celles sur lesquelles it existait des statistiques en ce qui concerne le commerce international.

There are four major commodity groups: agricultural products, natural resources and raw materials, energy products, and manufactured products. Manufactured products are divided into five groups: motor vehicles and parts, resource-related products, low-technology products, medium-technology products, and high-technology products. Motor vehicles are a separate category because trade is controlled by regulations rather than by competitive factors; resource-related manufactures are also separate because the determinant for trade is divine rather than technological. The group of high-technology products are further divided into six classes: chemicals, office machinery, other machinery, aircraft and parts, electrical products, and scientific instruments. The individual commodities which make up these groups and sub-groups are listed in the Appendix to this section.

Il y a quarte principaux groupes de marchandises: les produits agricoles, les ressources naturelles et les matières brutes, les produits énergétiques et les produits fabriqués. Ces derniers sont divisés en cinq sous-groupes: les véhicules automobiles et les pièces de rechange, les produits fabriqués reliés aux ressources naturelles, les produits de fabrication faiblement technologique, ceux de fabrication moyennement technologique et ceux de fabrication hautement technologique. Les véhicules automobiles constituent un sous-groupe à part car leur commerce est soumis à des règlements et non à la concurrence; les produits fabriqués reliés aux ressources naturelles représentent également un sous-groupe à part leur commerce repose plutôt sur la répartition au hasard des ressources que sur la technologie employée. Le sous-groupe des produits de fabrication hautement technologique est divisé en six catégories: les produits chimiques, les machines de bureau, les autres machines, les avions et les pièces connexes, les produits électriques et les instruments scientifiques. Les marchandises qui entrent dans la composition de ces groupes et sous-groupes sont données en annexe.

Figure 1
Balance of Trade in all Commodities
Balance commerciale de tous les produits

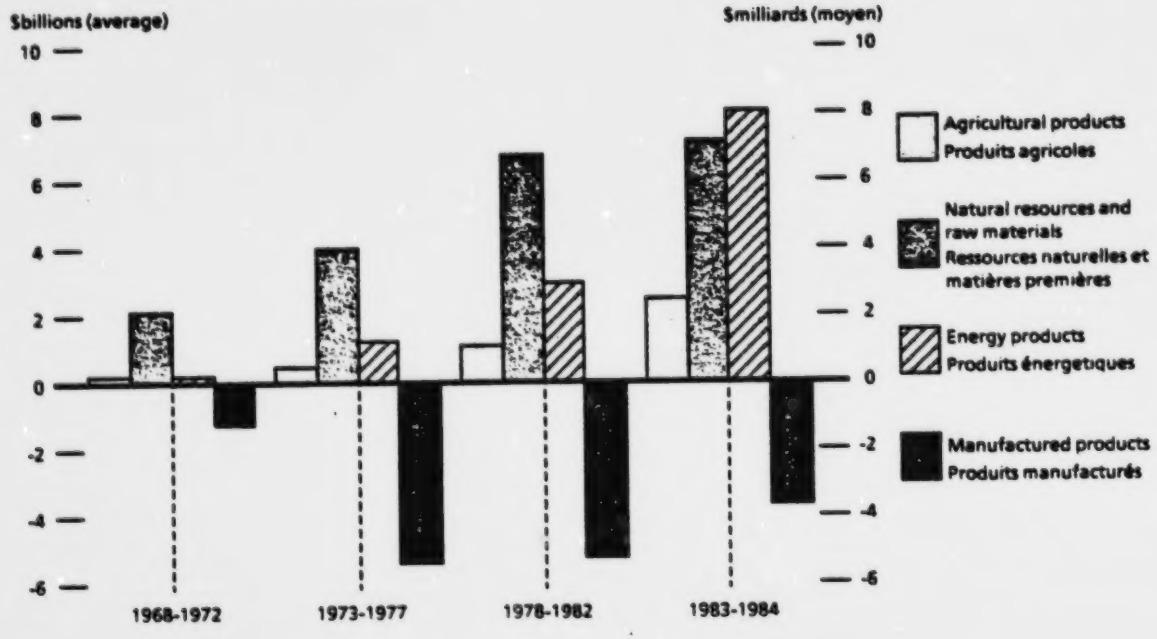

TABLE 1. Merchandise Exports, by Major Commodity Group
TABLEAU 1. Exportations de marchandises, selon le grand groupe de marchandises

Year / Année	Agricultural products / Produits agricoles	Natural resources and raw materials / Ressources naturelles et matières premières	Energy products / Produits énergetiques	Manufactured products / Produits manufacturés	Total
	millions of dollars - millions de dollars				
1968	793	2,503	682	9,236	13,214
1969	584	2,448	789	10,507	14,328
1970	808	2,863	1,007	11,625	16,303
1971	953	2,968	1,291	12,120	17,332
1972	1,084	3,313	1,699	13,509	19,605
1973	1,468	4,625	2,419	16,252	24,764
1974	2,237	4,851	5,018	19,461	31,567
1975	2,205	4,302	5,380	20,562	32,449
1976	1,979	5,473	5,188	24,863	37,503
1977	2,192	6,808	5,455	29,148	43,603
1978	2,368	7,545	6,016	36,184	52,113
1979	2,671	10,310	8,743	42,407	64,131
1980	4,288	10,114	10,914	48,510	73,826
1981	4,234	11,324	11,787	54,312	81,657
1982	4,945	8,943	12,410	55,221	81,519
1983	5,248	9,634	12,772	60,567	88,221
1984	5,545	11,406	14,695	77,133	108,779

Source: Summary of External Trade, Statistics Canada, Catalogue No. 6 5001.
Source: Sommaire du commerce exterieur, Statistique Canada, n° 6 5001 au catalogue.

TABLE 2. Merchandise imports, by Major Commodity Group
TABLEAU 2. Importations de marchandises, selon le grand groupe de marchandises

Year / Année	Agricultural products / Produits agricoles	Natural resources and raw materials / Ressources naturelles et matières premières	Energy products / Produits énergetiques	Manufactured products / Produits manufacturés	Total
	millions of dollars - millions de dollars				
1968	518	596	761	10,227	12,101
1969	557	577	740	12,064	13,938
1970	619	606	784	11,782	13,791
1971	648	629	917	13,257	15,451
1972	762	680	1,078	15,946	18,467
1973	1,065	908	1,329	19,774	23,077
1974	1,436	1,124	3,328	25,545	31,433
1975	1,531	1,207	4,167	27,486	34,391
1976	1,559	1,267	4,053	30,120	36,999
1977	1,842	1,483	4,152	34,464	41,941
1978	2,023	1,802	4,436	41,448	49,709
1979	2,321	2,606	5,758	51,619	62,304
1980	2,803	3,603	8,423	53,535	68,364
1981	3,045	3,474	9,584	61,657	77,760
1982	2,694	2,778	6,780	54,590	66,842
1983	2,697	3,085	5,165	63,660	74,607
1984	3,091	3,523	6,136	81,468	94,218

Source: Summary of External Trade, Statistics Canada, Catalogue No. 65-001.
Source: Sommaire du commerce extérieur, Statistique Canada, n° 65-001 au catalogue.

TABLE 3. Balance of Merchandise Trade, by Major Commodity Group
TABLEAU 3. Balance du commerce de marchandises, selon le grand groupe de marchandises

Year Année	Agricultural products Produits agricoles	Natural resources and raw materials Ressources naturelles et matières premières	Energy products Produits énergétiques	Manufactured products Produits manufacturés	Total
	millions of dollars - millions de dollars				
1968	275	1,907	-78	-992	1,112
1969	27	1,871	49	-1,554	393
1970	189	2,257	223	-156	2,513
1971	305	2,239	374	-1,137	1,781
1972	332	2,633	621	-2,438	1,138
1973	403	3,717	1,090	-3,522	1,688
1974	801	3,728	1,691	-6,083	137
1975	674	3,095	1,213	-6,926	-1,944
1976	420	4,206	1,134	-5,254	506
1977	349	5,326	1,303	-5,315	1,663
1978	345	5,743	1,580	-5,263	2,405
1979	350	7,704	2,985	-9,212	1,827
1980	1,485	6,511	2,491	-5,024	5,463
1981	1,189	7,850	2,203	-7,346	3,896
1982	2,251	6,165	5,630	630	14,676
1983	2,551	6,549	7,607	-3,075	13,632
1984	2,954	7,883	8,559	-4,335	14,561

Source: Tables 1 and 2.
Source: Tableaux 1 et 2.

Figure 2
Balance of Trade in Manufactured Products
Balance commerciale de produits manufacturés

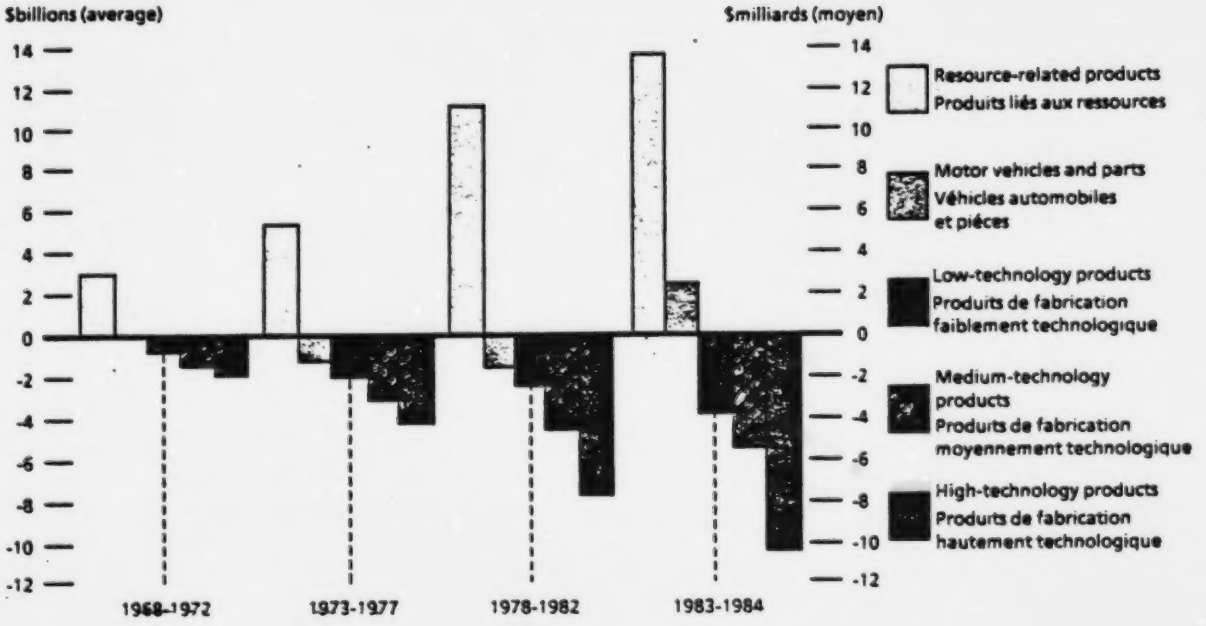

TABLE 4. Exports of Manufactured Products, by Technology Group
TABLEAU 4. Exportations de produits manufacturés, selon la catégorie de technologie

Year / Année	High-technology products / Produits de fabrication hautement technologique	Medium-technology products / Produits de fabrication moyennement technologique	Low-technology products / Produits de fabrication faiblement technologique	Resource-related products / Produits liés aux ressources	Motor vehicles and parts / Véhicules automobiles et pièces	Total
	millions of dollars - millions de dollars					
1968	1,240	436	1,217	3,597	2,746	9,236
1969	1,339	513	1,365	3,776	3,514	10,507
1970	1,533	572	1,656	4,365	3,499	11,625
1971	1,537	555	1,783	4,074	4,171	12,120
1972	1,800	696	2,007	4,288	4,178	13,509
1973	2,058	1,017	2,589	5,173	5,415	16,252
1974	2,491	1,238	2,669	7,346	5,717	19,461
1975	2,887	1,408	2,915	6,919	6,433	20,562
1976	3,202	1,766	3,417	8,254	8,224	24,863
1977	3,591	1,895	3,813	9,425	10,424	29,148
1978	4,904	2,493	4,817	11,430	12,540	36,184
1979	6,639	4,033	6,069	13,766	11,900	42,406
1980	7,962	4,903	6,537	18,290	10,818	48,510
1981	9,375	5,024	8,281	18,548	13,084	54,312
1982	9,111	5,164	7,987	16,441	16,518	55,221
1983	9,101	5,173	8,063	16,873	21,357	60,567
1984	11,488	6,415	9,035	20,791	29,404	77,133

Source: Summary of External Trade, Statistics Canada, Catalogue No. 65-001.
Source: Sommaire du commerce extérieur, Statistique Canada, n° 65-001 au catalogue.

LE 5. Imports of Manufactured Products, by Technology Group
TABLEAU 5. Importations de produits manufacturés, selon la catégorie de technologie

Year / Année	High-technology products / Produits de fabrication hautement technologique	Medium-technology products / Produits de fabrication moyennement technologique	Low-technology products / Produits de fabrication faiblement technologique	Resource-related products / Produits liés aux ressources	Motor vehicles and parts / Véhicules automobiles et pièces	Total
	millions of dollars - millions de dollars					
1968	2,813	1,721	1,942	750	3,001	10,227
1969	3,235	2,009	2,325	950	3,546	12,064
1970	3,290	2,011	2,370	860	3,252	11,782
1971	3,505	2,066	2,595	981	4,110	13,257
1972	4,157	2,603	3,105	1,137	4,934	15,946
1973	5,157	3,303	3,784	1,449	6,081	19,774
1974	6,614	4,575	4,773	2,459	7,124	25,545
1975	7,319	4,780	5,090	2,062	8,237	27,486
1976	7,811	4,972	5,889	2,010	9,440	30,120
1977	8,665	5,672	6,398	2,154	11,576	34,464
'8	10,768	6,997	7,516	2,780	13,386	41,448
1979	13,951	8,670	9,135	4,702	15,161	51,619
1980	16,120	9,531	9,359	5,047	13,479	53,535
1981	19,078	10,671	10,110	5,801	15,996	61,657
1982	16,762	8,837	10,016	3,851	15,124	54,590
1983	18,468	10,101	11,170	4,606	19,315	63,660
1984	23,462	12,529	13,488	5,529	26,460	81,468

Source: Summary of External Trade, Statistics Canada, Catalogue No. 65-001.
Source: Sommaire du commerce extérieur, Statistique Canada, n° 65-001 au catalogue.

TABLE 6. Balance of Trade in Manufactured Products, by Technology Group
TABLEAU 6. Balance du commerce de produits manufacturés, selon la catégorie de technologie

Year / Année	High-technology products / Produits de fabrication hautement technologique	Medium-technology products / Produits de fabrication moyennement technologique	Low-technology products / Produits de fabrication faiblement technologique	Resource-related products / Produits liés aux ressources	Motor vehicles and parts / Véhicules automobiles et pièces	Total
	millions of dollars - millions de dollars					
1968	-1,574	-1,285	-725	2,847	-255	-992
1969	-1,894	-1,495	-960	2,827	-32	-1,554
1970	-1,755	-1,439	-713	3,504	247	-156
1971	-1,967	-1,512	-812	3,093	61	-1,137
1972	-2,369	-1,907	-1,097	3,151	-216	-2,438
1973	-3,100	-2,286	-1,194	3,724	-666	-3,522
1974	-4,120	-3,338	-2,103	4,886	-1,408	-6,083
1975	-4,433	-3,371	-2,175	4,857	-1,804	-6,926
1976	-4,607	-3,205	-2,471	6,244	-1,215	-5,254
1977	-5,073	-3,777	-2,585	7,272	-1,152	-5,315
1978	-5,864	-4,504	-2,699	8,650	-846	-5,263
1979	-7,312	-4,637	-3,066	9,064	-3,261	-9,...
1980	-8,157	-4,628	-2,821	13,243	-2,661	-5,024
1981	-9,705	-5,647	-1,829	12,747	-2,912	-7,346
1982	-7,652	-3,673	-2,029	12,590	1,394	630
1983	-9,349	-4,928	-3,107	12,267	2,042	-3,075
1984	-11,974	-6,114	-4,453	15,262	2,944	-4,335

Source: Tables 4 and 5.
Source: Tableaux 4 et 5.

Figure 3
Balance of Trade in High-technology Products
Balance commerciale de produits de fabrication hautement technologique

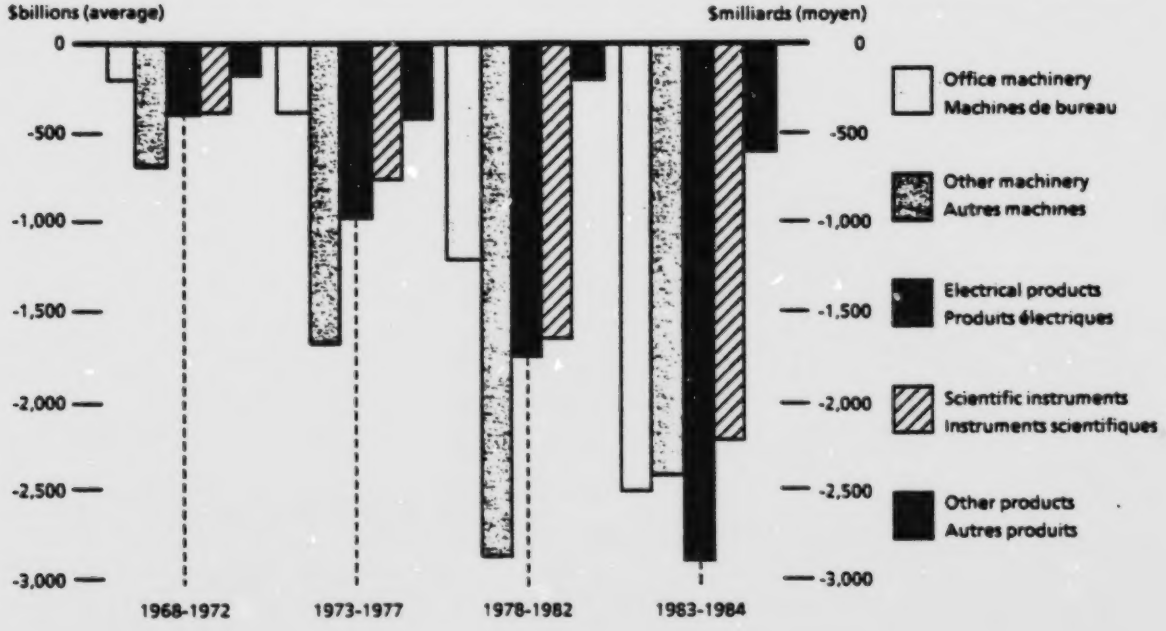

TABLE 7. Exports of High-technology Products, by Product Group
TABLEAU 7. Exportations de produits de fabricaton hautement technologique, selon la catégorie de produit

Year / Année	Chemicals / Produits chimiques	Office machinery / Machines de bureau	Other machinery / Autres machines	Aircraft and parts / Avions et pièces	Electrical products / Produits électriques	Scientific instruments / Instruments scientifques	Total
	millions of dollars - millions de dollars						
1968	164	50	312	369	248	97	1,240
1969	197	71	360	331	262	118	1,339
1970	230	114	378	380	294	137	1,533
1971	243	147	407	332	282	126	1,537
1972	271	184	438	476	289	142	1,800
1973	345	205	532	414	389	173	2,058
1974	423	217	766	433	462	190	2,491
1975	442	273	1,054	422	463	233	2,887
1976	636	332	1,022	453	505	254	3,202
1977	759	347	1,200	486	531	268	3,591
1978	1,183	475	1,447	691	735	373	4,904
1979	1,540	642	1,928	1,005	1,017	507	6,639
1980	1,777	739	2,137	1,403	1,281	625	7,96
1981	2,035	874	2,598	1,497	1,651	720	9,375
1982	1,789	928	2,165	1,732	1,679	818	9,111
1983	1,813	1,068	1,871	1,520	1,877	952	9,101
1984	2,283	1,377	2,109	1,781	2,902	1,036	11,488

Source: Summary of External Trade, Statistics Canada, Catalogue No. 65-001.
Source: Sommaire de commerce extérieur, Statistique Canada, n° 65-001 au catalogue.

BLE 8. Imports of High-technology Products, by Product Group
TABLEAU 8. Importations de produits de fabricaton hautement technologique, selon la catégorie de produit

Year / Année	Chemicals / Produits chimiques	Office machinery / Machines de bureau	Other machinery / Autres machines	Aircraft and parts / Avions et pièces	Electrical products / Produits électriques	Scientific instruments / Instruments scientifques	Total
	millions of dollars - millions de dollars						
1968	323	200	919	437	505	429	2,813
1969	386	268	1,032	401	637	510	3,235
1970	462	314	975	384	619	535	3,290
1971	435	368	1,122	289	738	554	3,505
1972	500	447	1,352	294	949	625	4,167
1973	599	497	1,627	511	1,165	757	5,157
1974	889	609	2,175	667	1,362	913	6,614
1975	806	659	2,857	695	1,296	1,006	7,319
1976	919	736	3,089	406	1,602	1,058	7,811
1977	1,119	798	3,173	439	1,843	1,293	8,665
1978	1,268	1,075	3,714	840	2,258	1,613	10,768
1979	1,531	1,348	4,982	1,364	2,764	1,962	13,951
1980	1,554	1,903	5,470	1,828	3,007	2,357	16,120
1981	1,802	2,582	5,972	2,347	3,669	2,708	19,080
1982	1,675	2,867	4,483	1,523	3,489	2,726	16,762
1983	2,100	3,111	4,077	1,814	4,454	2,914	18,468
1984	2,520	4,365	4,727	2,230	6,101	3,518	23,462

Source: Summary of External Trade, Statistics Canada, Catalogue No. 65-001.
Source: Sommaire de commerce extérieur, Statistique Canada, n° 65-001 au catalogue.

TABLE 9. Balance of Trade in High-technology Products, by Product Group
TABLEAU 9. Balance du commerce de produits de fabrication hautement technologique, selon la catégorie de produit

Year / Année	Chemicals / Produits chimiques	Office machinery / Machines de bureau	Other machinery / Autres machines	Aircraft and parts / Avions et pièces	Electrical products / Produits électriques	Scientific instruments / Instruments scientifques	Total
	millions of dollars - millions de dollars						
1968	-160	-150	-607	-68	-257	-332	-1,574
1969	-189	-197	-672	-69	-375	-392	-1,894
1970	-232	-200	-597	-4	-325	-397	-1,755
1971	-192	-220	-715	43	-455	-428	-1,967
1972	-230	-263	-914	181	-660	-483	-2,369
1973	-254	-292	-1,096	-97	-777	-584	-3,100
1974	-465	-391	-1,409	-234	-899	-722	-4,120
1975	-364	-386	-1,803	-274	-833	-773	-4,433
1976	-283	-404	-2,067	48	-1,097	-804	-4,607
1977	-360	-451	-1,973	47	-1,311	-1,025	-5,073
1978	-85	-600	-2,267	-149	1,523	-1,240	-5,864
1979	9	-705	-3,054	-359	1,747	-1,455	-7,312
1980	223	-1,164	-3,333	-425	-1,726	-1,732	-8,151
1981	233	-1,708	-3,374	-850	-2,018	-1,988	-9,705
1982	114	-1,939	-2,318	209	-1,810	-1,908	-7,652
1983	-267	-2,043	-2,205	-294	-2,577	-1,962	-9,349
1984	-237	-2,989	-2,618	-449	-3,199	-2,482	-11,974

Source: Tables 7 and 8.
Source: Tableaux 7 et 8.

Figure 4
Trade in Selected High-technology Products
Commerce de certains produits de fabrication hautement technologique

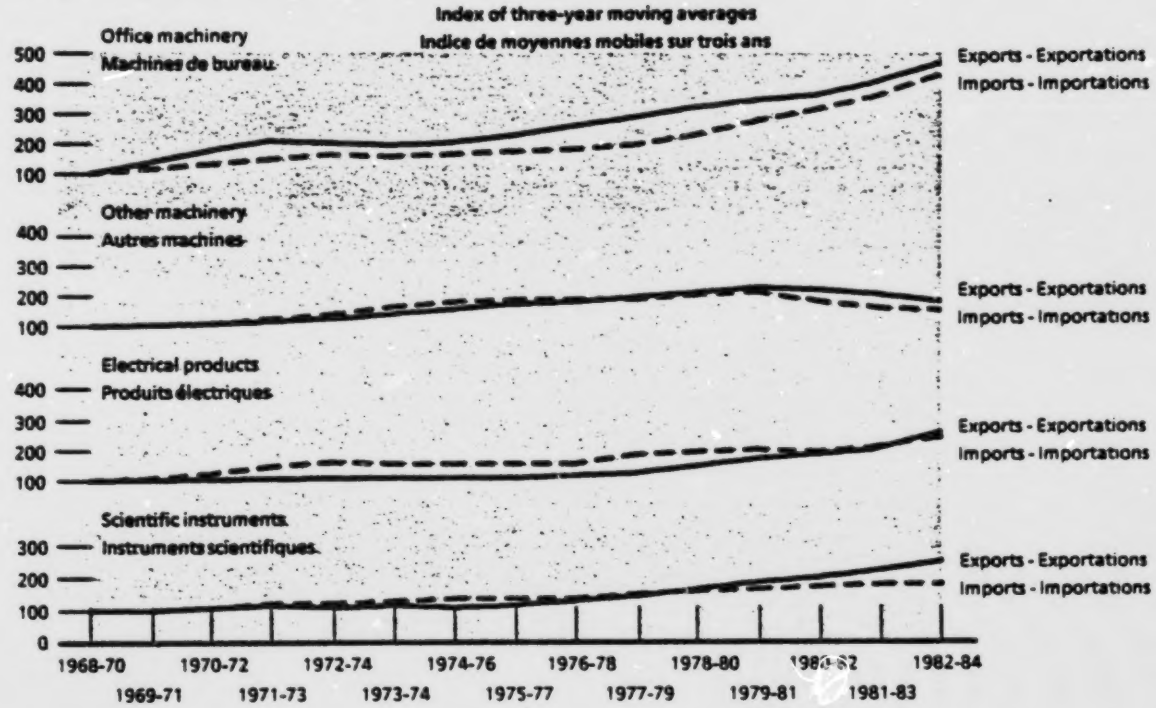

TABLE 10. Trade in Selected High-technology Products
TABLEAU 10. Commerce de certains produits de fabrication hautement technologique

Year / Année	Office machinery / Machines de bureau		Other machinery / Autres machines		Electrical products / Produits électriques		Scientific instruments / Instruments scientifiques	
	Exports / Exportations	Imports / Importations	Exports / Exportations	Imports / Importations	Exports / Exportations	Imports / Importations	Exports / Exportations	Imports / Importations
	Index of three-year moving averages - Indice de moyennes mobiles sur trois ans							
1968-1970	100	100	100	100	100	100	100	100
1969-1971	140	119	107	104	102	111	105	105
1970-1972	182	138	112	112	103	124	110	111
1971-1973	208	153	118	127	107	147	113	120
1972-1974	206	164	127	144	110	162	112	128
1973-1975	200	163	146	162	109	158	113	131
1974-1976	206	165	158	178	105	157	112	131
1975-1977	224	166	171	184	102	159	117	134
1976-1978	254	180	179	185	113	175	131	144
1977-1979	285	195	199	192	129	188	148	157
1978-1980	319	228	210	201	149	194	170	168
1979-1981	344	272	225	208	173	201	186	176
1980-1982	359	315	216	184	188	194	202	178
1981-1983	394	353	202	160	205	212	226	182
1982-1984	435	413	184	142	252	248	251	194

Source: Receipts and payments from Tables 7 and 8, deflated by the implicit price indexes for exports and imports.
Source: Données sur les recettes et les paiements des tableaux 7 et 8 dégonflées à l'aide de l'indice implicite des prix à l'exportation et à l'importation.

APPENDIX

COMMODITIES ASSIGNED TO TECHNOLOGICAL CLASSES

A. EXPORTS

1. All Commodities

Manufactured products
Energy products
Natural resources and raw materials

Agricultural products

2. Manufactured Products

High-technology commodities

Medium-technology commodities

Low-technology commodites

Motor vehicles
Resource-related manufactured goods

3. Energy Products

Crude petroleum
Natural gas
Coal and other bituminous substances

Petroleum and coal products
Electricity

4. Natural Resources and Raw Materials

Crude materials, inedible
Less: Crude petroleum
Natural gas
Coal and other bituminous substances
Lumber, softwood
Lumber, hardwood

5. Agricultural Products

Live animals
Fish, whole or dressed, fresh or frozen
Wheat

PRODUITS APPARTENANT AUX CATÉGORIES DE TECHNOLGIE

A. EXPORTATIONS

1. Ensemble des produits

Produits fabriqués
Produits énergétiques
Ressources naturelles et matières brutes
Produits agricoles

2. Produits fabriqués

Produits de fabrication hautement technologique
Produits de fabrication moyennement technologique
Produits de fabrication faiblement technologique
Automobiles
Produits fabriqués liés aux ressources naturelles

3. Produits énergétiques

Pétrole brut
Gaz naturel
Charbon et substances bitumineuses brutes
Produits du pétrole et du charbon
Électricité

4. Ressources naturelles et matières brutes

Matières brutes, non comestibles
Moins: Pétrole brut
Gas naturel
Charbon et substances bitumineuses brutes
Bois d'oeuvre, résineux
Bois d'oeuvre, feuilles

5. Produits agricoles

Animaux vivants
Poissons frais ou congelés

Blé

A. **EXPORTS** - Continued

6. High-technology Commodities

Chemicals:
- Chemical elements
- Other inorganic chemicals
- Synthetic rubber and plastic materials
- Plastics, basic shapes and forms
- Medical and pharmaceutical products

Machinery:
- Engines and turbines
- Electric generators
- Other general purpose industrial machinery
- Drilling, etc.
- Construction
- Pulp and paper
- Agricultural

Aircraft:
- Aircraft and engines
- Aircraft engines
- Aircraft parts

Electrical products:
- Television, radio
- Other telecommunication
- Electric lighting

Scientific instruments:
- Navigation
- Other measuring
- Medical, ophthalmic and orthopedic supplies
- Photographic

Office machines

7. Medium-technology Commodities

- Organic chemicals
- Other chemical products
- Materials handling machinery
- Metalworking machinery
- Woodworking machinery
- Plastics machinery
- Other special industries machinery
- Heating and refrigeration equipment

A. **EXPORTATIONS** - suite

6. Produits de fabrication hautement technologique

Produits chimiques:
- Éléments chimiques
- Autres produits chimiques inorganiques
- Caoutchouc synthétique et matières plastiques
- Formes de base en matières plastiques
- Médicaments et produits pharmaceutiques

Machines:
- Moteurs et trubines
- Génératrices électriques
- Autres machines industrielles d'usage général
- Excavatrices, etc.
- Machines de construction
- Machines pour l'industrie de la pâte et du papier
- Machines agricoles

Avions:
- Avions complets y compris moteurs
- Moteurs d'avions
- Pièces d'avions

Produits électriques:
- Téléviseurs, radios
- Autre matériel de télécommunication
- Appareils d'éclairage électrique

Instruments scientifiques:
- Matériel de navigation
- Autres mesures
- Fournitures médicales ophtalmiques et othopédiques
- Articles photographiques

Machines de bureau

7. Produits de fabrication moyennement technologique

- Produits chimiques organiques
- Autres produits chimiques
- Machines et equipement de manutention
- Machines-outils, travail des métaux
- Machines à travailler le bois
- Machines à travailler les plastiques
- Machines pour autres industries spéciales
- Appareils de chauffage et de réfrigération

A. EXPORTS - Concluded

Cooking equipment
Hand tools
Other equipment and tools
Railway stock
Ships
Other transportation equipment
Containers
Prefab buildings
Other end products

8. Low-technology Commodities

Textiles
Leather
Shingles and shakes
Oils, fats, etc.
Metal fabricated basic products
Abrasive basic products
Other non-metallic mineral basic products
Other fabricated materials, inedible

Apparel
Footwear
Toys
Other personal goods
Printed matter
Food, feed, beverages and tobacco
Less: Fish, whole or dressed
Wheat

9. Motor Vehicles

Passenger autos
Trucks
Other motor vehicles
Motor vehicle engines
Motor vehicle parts

10. Resource-related Manufactured Goods

Wood and paper
Less: Lumber, soft
Lumber, hard shingles

Fertilizer
Iron and steel
Non-ferrous metals

A. EXPORTATIONS - fin

Appareils de cuisson
Outils à main
Autres matériel et outils
Matériel roulant de chemin de fer
Navires
Autre matériel de transport
Récipients
Batiments préfabriqués
Autre produits finis

8. Produits de fabrication faiblement technologique

Textiles
Cuir
Bardeaux et bardeaux pour façade
Huiles, matières grasses, etc.
Ouvrages de base en métal
Produits de base en abrasifs
Autres produits minéraux non-métalliques de base
Autres matières travaillées, non comestibles
Vêtements
Chaussures
Jouets
Autres effets personnels
Imprimés
Aliments, provendes, boissons et tabacs
Moins: Poissons frais ou congelés
Blé

9. Automobiles

Voitures particulières et chassis
Camions
Autres véhicules à moteurs
Moteurs de véhicules automobiles
Pièces de véhicules

10. Produits fabriqués liés aux ressources naturelles

Bois et papier
Moins: Bois d'oeuvre, résineux
Bois d'oeuvre, feuilles bardeaux
Engrais
Fer et acier
Métaux non-ferreux

B. IMPORTS

1. All Commodities

Manufactured products
Energy products
Natural resources and raw materials

Agricultural products

2. Manufactured Products

High-technology commodities

Medium-technology commodites

Low-technology commodities

Motor vehicles
Resource-related manufactured goods

3. Energy Products

Coal
Crude petroleum
Other crude bituminous substances
Fuel oil
Lubricating oils and greases
Coke of petroleum and coal
Other petroleum and coal products
Electricity

4. Natural Resources and Raw Materials

Crude materials, inedible
Less: Coal
Crude petroleum
Other crude bituminous substances

5. Agricultural Products

Live animals
Fish and marine animals
Corn (maize), shelled
Bananas and plaintains, fresh

Grapes, fresh
Oranges, tangerines, mandarines, fresh

B. IMPORTATIONS

1. Ensemble des produits

Produits fabriqués
Produits énergétiques
Ressources naturelles et matières brutes
Produits agricoles

2. Produits fabriqués

Produits de fabrication hautement technologique
Produits de fabrication moyennement technologique
Produits de fabrication faiblement technologique
Automobiles
Produits fabriqués liés aux ressources naturelles

3. Produits énergétiques

Charbon
Pétrole brut
Autres substances bitumineuses brutes
Mazout
Huiles et graisses lubrifiantes
Coke de pétrole et de charbon
Autres dérivés du pétrole et du charbon
Électricité

4. Ressources naturelles et matières brutes

Matières brutes, non comestibles
Moins: Charbon
Pétrole brut
Autres substances bitumineuses brutes

5. Produits agricoles

Animaux vivants
Poisson et animaux marins
Blé d'Inde (maïs), égrené
Bananes et bananes des Antilles, fraîches

Raisins, frais
Oranges, mandarines, tangerines, fraîches

B. IMPORTS -Continued

Other fresh fruits and berries
Nuts, except oil nuts
Tomatoes, fresh
Other fresh vegetables
Raw sugar
Cocoa and chocolate
Coffee
Tea

6. High-technology Commodities

Chemicals:
Inorganic chemicals
Synthetic and reclaimed rubber
Plastics materials, not shaped
Plastic film and sheet

Other plastics, basic shapes and forms
Medical and pharmaceutical products

Machinery:
Engines and turbines, diesel, general purpose
Engines and turbines, general purpose, n.e.s.
Electric generators and motors
Compressors, blowers and vacuum pumps

Pumps, except oil well pumps
Other general purpose industrial machinery
Drilling machinery and drill bits

Power shovels
Bulldozing and similar equipment
Front end loaders
Other excavating machinery
Mining, oil and gas machinery
Construction and maintenance machinery
Pulp and paper industries machinery

Agricultural machinery and tractors

Aircraft:
Aircraft, complete with engines
Aircraft engines and parts
Aircraft parts, except engines

B. IMPORTATIONS - suite

Autres fruits frais et baies
Noix, sauf noix oléagineuses
Tomates fraîches
Autres légumes frais
Sucre brut
Cacao et chocolat
Café
Thé

6. Produits de fabrication hautement technologique

Produits chimiques:
Produits chimiques inorganiques
Caoutchouc synthétique et régénéré
Matières plastiques, non façonnées
Pellicule et feuille en matières plastiques
Autres profilés, formes de base en matières plastiques
Médicaments et produits pharmaceutiques

Machines:
Moteurs et turbines, diesel, d'usage général
Moteurs et turbines, d'usage général, n.d.a.
Génératrices et moteurs électriques
Compresseurs, souffleurs et pompes à mécanique
Pompes, sauf pour puits d'huile
Autres machines industrielles d'usage général
Machines de forage et fleurels de perforatrice
Pelles mécaniques
Bulldozers et machines semblables
Chargeurs-niveleurs
Autres machines à creuser
Machines pour mines, pétrole et gaz
Machines de construction et d'entretien
Machines pour industrie de la pâte et du papier
Machines et tracteurs agricoles

Avions:
Avions complets y compris moteurs
Moteurs d'avions et leurs pièces
Pièces d'avions, sauf moteurs

8. IMPORTS - Continued

Electrical products:
- Telephone and telegraph equipment
- Televisions, radios and phonographs
- Electronic tubes and semi-conductors
- Other telecommunications equipment
- Electric lighting fixtures
- Switchgear and protective equipment

- Industrial control equipment
- Other electric lighting and distribution equipment
- Auxiliary electric equipment for engines

Scientific instruments:
- Electrical property measuring instruments
- Miscellaneous measuring, controlling instruments
- Medical and related equipment

- Navigation equipment
- Other measuring, laboratory equipment

- Medical, ophthalmic and orthopedic supplies
- Unexposed photographic film and plates
- Other photographic goods

Office machines:
- Electronic computers
- Other office machines

7. Medium-technology Commodities

Organic chemicals
Dyestuffs, except dyeing extracts
Pigments, lakes and toners

Paints and related products
Other chemical products
Bearings
Other mechanical power transmission equipment
Packaging machinery
Conveyors and conveying systems
Elevators and escalators
Industrial trucks, tractors, trailers, stackers

8. IMPORTATIONS - suite

Electrical products:
- Telephone and telegraph equipment
- Televisions, radios and phonographs
- Electronic tubes and semi-conductors
- Other telecommunications equipment
- Appareils d'éclairage électrique
- Mécanisme de commutation et de protection
- Mécanisme de commande industriel
- Autre matériel électrique d'éclairage et de distribution
- Matériel électrique auxiliaire pour moteurs

Instruments scientifiques:
- Instruments à mesurer les propriétés électriques
- Instruments mesureurs-régulaterus divers
- Matériel de médecine et d'usage connexe
- Matériel de navigation
- Autres instruments de mesure, de laboratoire, etc.
- Fournitures médicales ophtalmiques et orthopédiques
- Films, plaques vierges pour photographie
- Autres articles photographiques

Machines de bureau:
- Ordinateurs électroniques
- Autres machines et matériel de bureau

7. Produits de fabrication moyennement technologique

Produits chimiques organiques
Matières colorantes sauf extraits tinctoriaux
Pigments, laques et tonifiants
Peintures et produits connexes
Autres produits chimiques
Coussinets
Autres matériels de transmission d'énergie mécanique
Machines à empaqueter ou à emballer
Convoyeurs et ensembles convoyeurs
Ascenseurs et escalateurs
Camions, tracteurs, remorques, empileurs, industrielles

B. **IMPORTS** - Continued	B. **IMPORTATIONS** - suite
Hoisting machinery	Appareils de levage
Other materials handling equipment	Autre matériel de manutention des matériaux
Machine tools, metal working	Machines-outils, travail des métaux
Welding apparatus and equipment	Appareils et outillage à souder
Rolling mill machinery	Machines pour usines de laminage
Other metalworking machinery	Autres machines pour le travail des métaux
Printing presses	Presses à imprimer
Other printing machinery	Autres machines et appareils d'imprimerie
Spinning, weaving and knitting machinery	Machines pour filer, tisser et tricoter
Other textile industries machinery	Autres machines pour les industries textiles
Food, beverages and tobacco industries machinery	Machines industries d'aliments, boissons, tabacs
Plastics and chemicals industries machinery	Machines pour industries des matières plastiques et chimiques
Other special industry machinery	Autres machines pour industries spéciales
Railway and street railway rolling stock	Matériel roulant de chemin de fer et tramway
Marine engines and parts	Moteurs marins et leurs pièces
Ships, boats and parts, except engines	Navires, bateaux et pièces sauf les moteurs
Other transportation equipment	Autre matériel de transport
Air conditioning and refrigeration equipment	Appareils de climatisation et de réfrigération
Safety and sanitation equipment	Matériel de sécurité et d'assainissement
Service industry equipment	Matériel pour l'industrie des services
Hand tools and cutlery	Outils à main de coutellerie
Miscellaneous equipment and tools	Matériel divers et outils
Watches, clocks, jewellery and silverware	Montres, horloges, bijoux et argenterie
Stationers' and office supplies	Fournitures de papeteries et de bureau
Containers and closures	Récipients et femeteurs
Other end products, inedible	Autres produits finis, non comestibles

8. IMPORTS - Continued

8. Low-technology Commodities

Meat, fresh, chilled or frozen	Viandes fraîches, réfrigérées ou congelées
Other meat and meat preparations	Autres viandes et préparations de viandes
Dairy produce, eggs and honey	Produits, laitiers, oeufs et miel
Other cereals and cereal preparations	Autres céréales et préparations céréalières
Fruits, dried or dehydrated	Fruits séchés ou déshydratés
Orange juice and concentrates	Jus d'orange et concentrés
Other fruit juices and concentrates	Autres jus de fruits et concentrés
Fruits and products, canned	Fruits et produits en boîtes
Other fruits and fruit preparations	Autres fruits et préparations à base de fruits
Other vegetables and vegetable preparations	Autres légumes et préparations à base de légumes
Refined sugar, molasses and syrups	Sucre raffiné, mélasse et sirops
Sugar preparations and confectionary	Préparations à base de sucre et confiserie
Other foods and materials for foods	Autres aliments et matières pour aliments
Oil seed cake and meal	Tourteaux et farine oléagineux
Other fodder and feed	Autres fourrages et provendes
Distilled alcoholic beverages	Boissons alcooliques distillées
Other beverages	Autres boissons
Tobacco	Tabac
Leather and leather fabricated materials	Cuir et demi-products en cuir
Rubber fabricated materials	Demi-produits en caoutchouc
Textiles	Textiles
Vegetable oils and fats, except essential oils	Huiles, matières grasses végétales sauf huiles essentielles
Other oils, fats, waxes, extracts, etc.	Autres huiles, matières grasses, cires, dérivés, etc.
Bolts, nuts and screws	Boulons, écrous et vis
Other basic hardware	Autre quincaillerie de base
Chains	Chaînes
Valves	Valves
Pipe fittings	Raccords de tuyauterie
Other metal fabricated basic products	Autres ouvrages de base en métal
Clay bricks, tiles and refractories	Briques, tuiles et mat. réfractaires en argile
Sheet and plate glass	Verre à vitres et à glaces
Other glass basic products	Autres ouvrages de base en verre
Natural and synthetic gemstones	Pierres fines naturelles et synthétiques
Other non-metallic mineral basic products	Autres produits minéraux non métalliques de base
Other fabricated materials, inedible	Autres matières travaillées, non comestibles

8. IMPORTATIONS - suite

8. Produits de fabrication faiblement technologique

B. IMPORTS - Concluded

Furniture and fixtures
Outerwear, except knitted
Outerwear, knitted
Other apparel and accessories

Footwear
Sporting and recreation equipment
Games, toys and children's vehicles
Housing furnishings
Kitchen utensils, cutlery and tableware
Other personal and household goods

Newspapers and magazines
Books and pamphlets
Other printed matter

9. Motor Vehicles

Passenger automobiles and chassis
Trucks, truck tractors and chassis
Other motor vehicles
Motor vehicle engines
Motor vehicle engine parts

Motor vehicle parts, except engines

10. Resource-related Manufactured Goods

Wood and paper products
Fertilizers and fertilizer materials
Iron and steel products
Non-ferrous metal products

B. IMPORTATIONS - fin

Meubles et accessoires
Vêtements de dessus non tricotés
Vêtements de dessus tricotés
Autres vêtements et accessoires vestimentaires
Chaussures
Articles pour sports et divertissements
Jeux, jouets et véhicules d'enfants
Fournitures de maison
Ustensiles de cuisine, de table et coutellerie
Autres effets personnels et articles ménagers
Journaux, revues et péridiques
Livres et brochures
Autres imprimés

9. Automobiles

Voitures particulières et châssis
Camions, tracteurs routiers et châssis
Autres véhicules moteurs
Moteurs de véhicules automobiles
Pièces de moteurs de véhicules automobiles
Pièces de véhicules auto sauf moteurs

10. Produits fabriqués liés aux ressources

Produits de bois et de papier
Engrais et matières fertilisantes
Produits de fer et acier
Produits de métaux non-ferreux

Volume 2

Statistics Canada Statistique Canada

Science, Technology and Capital Stock Division

Division des sciences, de la technologie et du stock de capital

Canada

TECHNOLOGY AND TRADE STATISTICS:

PART 2

Version française de
ce document de travail
disponsible sur
demande

Science, Technology and
Capital Stock Division

March 1986

Foreword

A common definition of "high-tech" products does not exist. As some readers will be aware, Statistics Canada has used a certain classification of products for a number of years now. The details of this classification, and statistics derived from its use, are contained in the working paper "Technology and Trade Statistics: Part 1" and in the publication **Science and Technology Indicators**, Catalogue No. 88-201.

The classification used to select the "high-tech" products for this paper is suggested by the Organization for Economic Cooperation and Development (OECD) in the paper "Trade in High Technology Products: An Initial Contribution to the Statistical Analysis of Trade Patterns in High Technology Products", DSTI/SPR/84.66, OECD, Paris, 30 January 1985, p. 5. The list is reproduced in the Annex at the end of this paper.

"Technology and Trade Statistics: Part 2" was prepared by Dawn Warner, under the direction of Humphrey Stead of the Science and Technology Statistics Section.

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Annex 43

Comment

1. The U.S.A. is, by far, our most important trading partner in the products classified as "high-tech". **Figures 1-8.**

2. Canada has a trade deficit in all products except telecommunications equipment (there is also a small trade surplus in aerospace products for countries other than the U.S.A.). **Figures 1-8.**

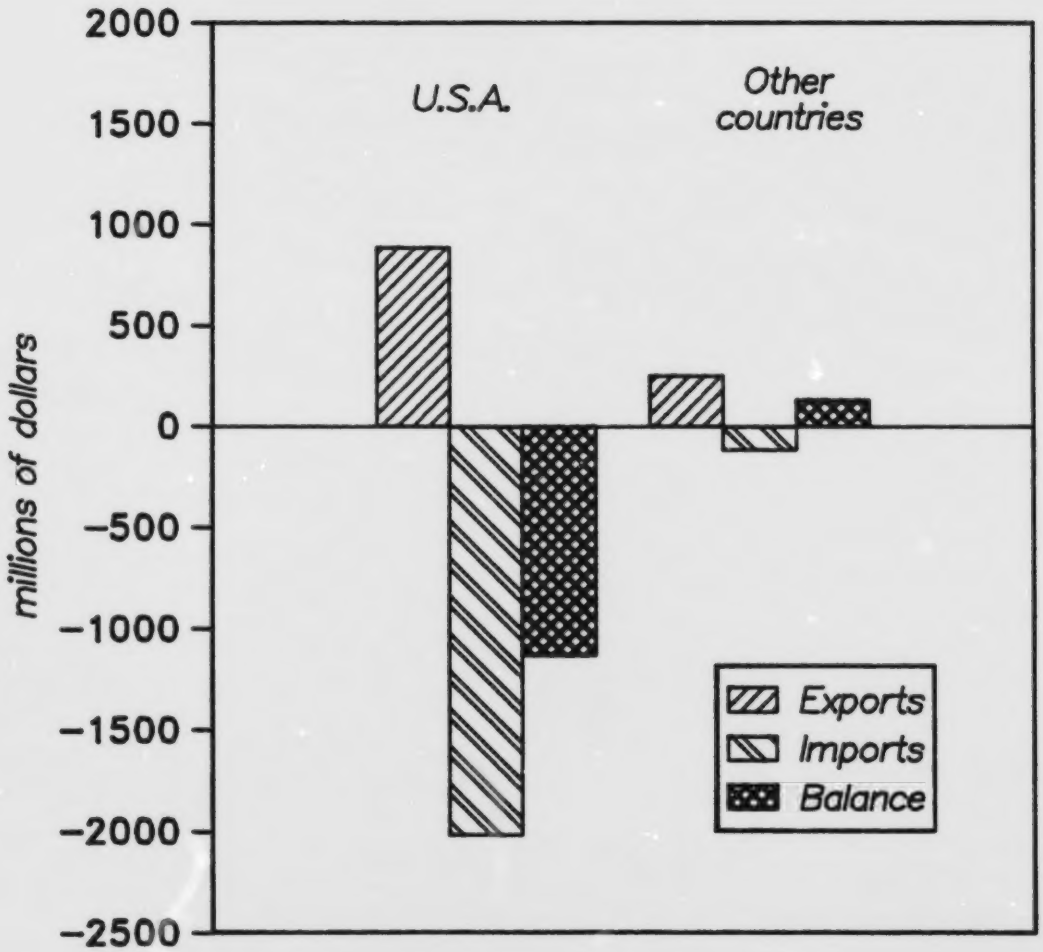
3. Computers and related products account for the greatest trading activity. **Figures 1-8.**

4. Trade in "high-tech" products is two-way with all countries except Japan. The ratio of Japanese imports to exports is far lower than for other countries. **Figures 9-13.**

5. During the decade 1975-1984, the pattern of trade has basically remained the same, although values have increased and there have been changes in trade for some products with some countries. For all countries other than the U.S.A. and Japan, Canada would have an overall surplus in trade in "high-tech" products if it were not for a sharp increase in imports of non-electrical machinery. **Figures 14-16.**

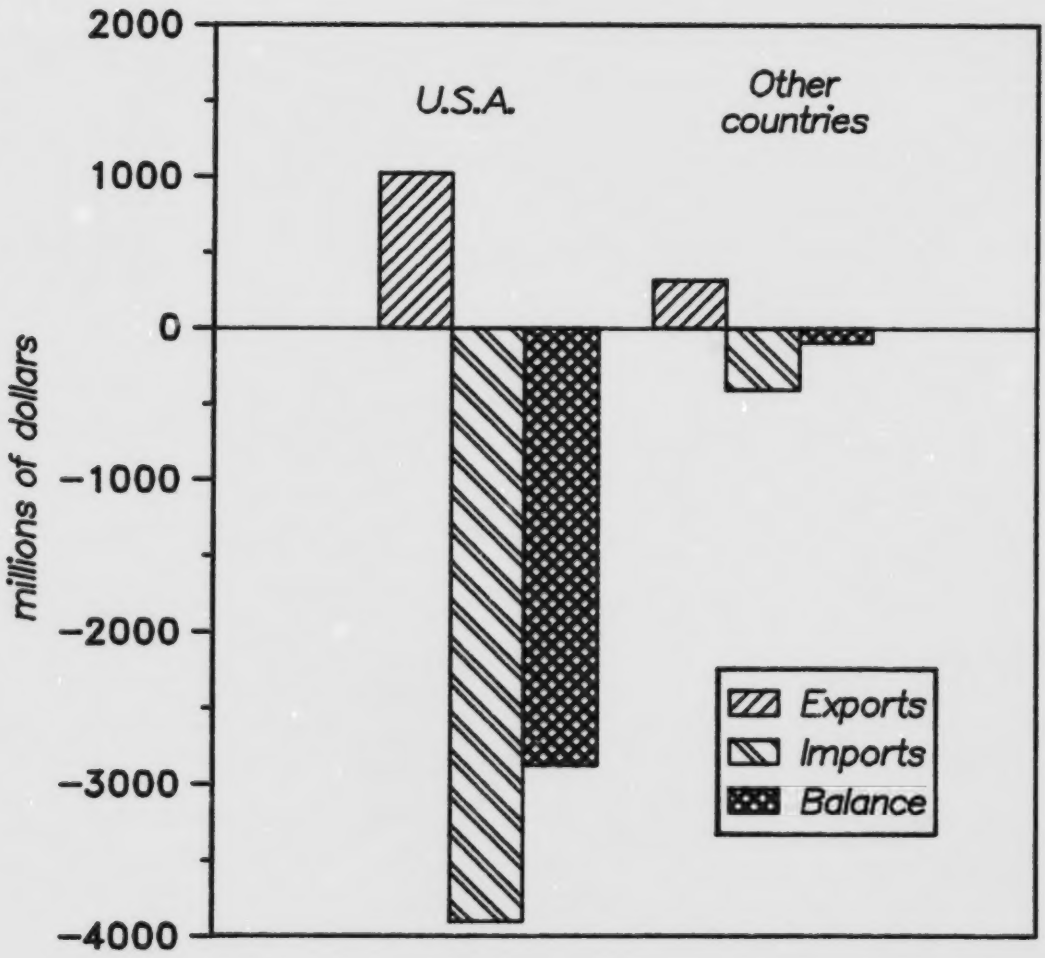
CHARTS

Fig. 1. Trade in Aerospace Products, 1984



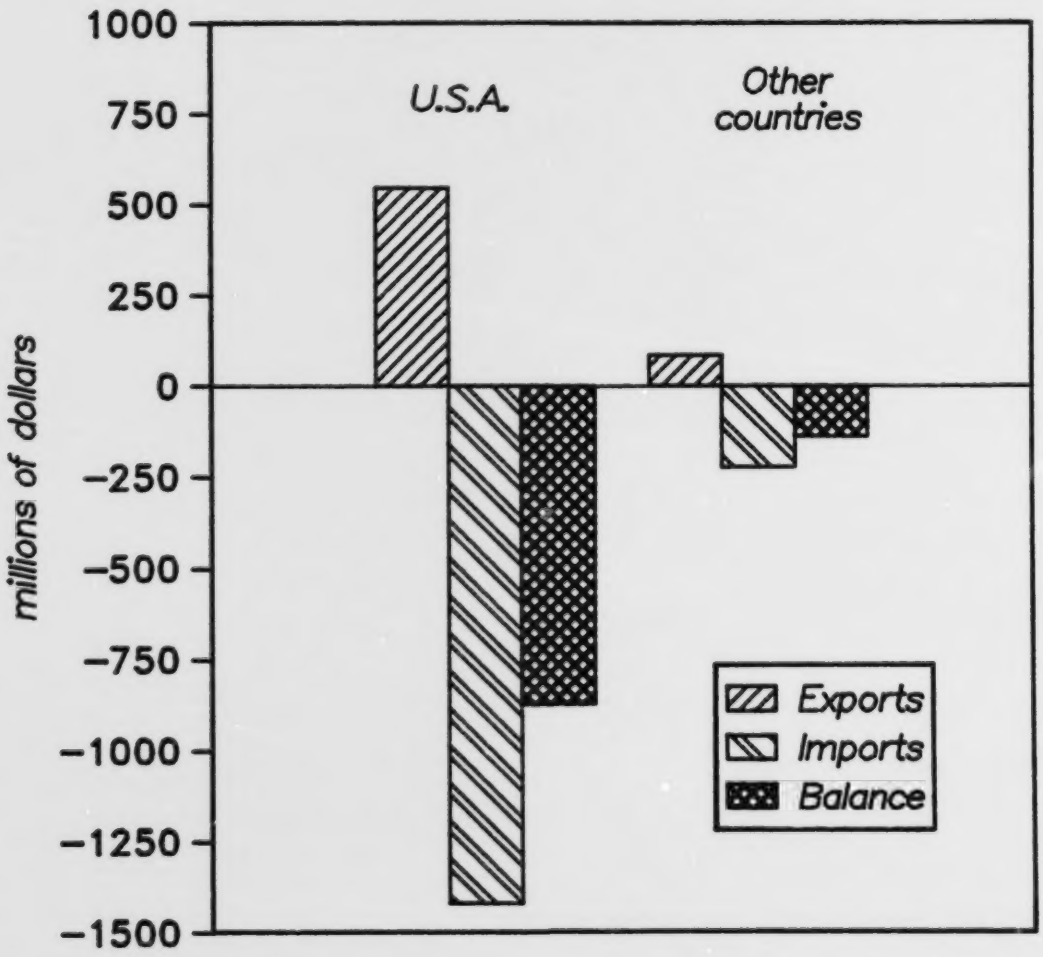
Source: Tables 1 and 2.

Fig. 2. Trade in Computers and Related Products, 1984



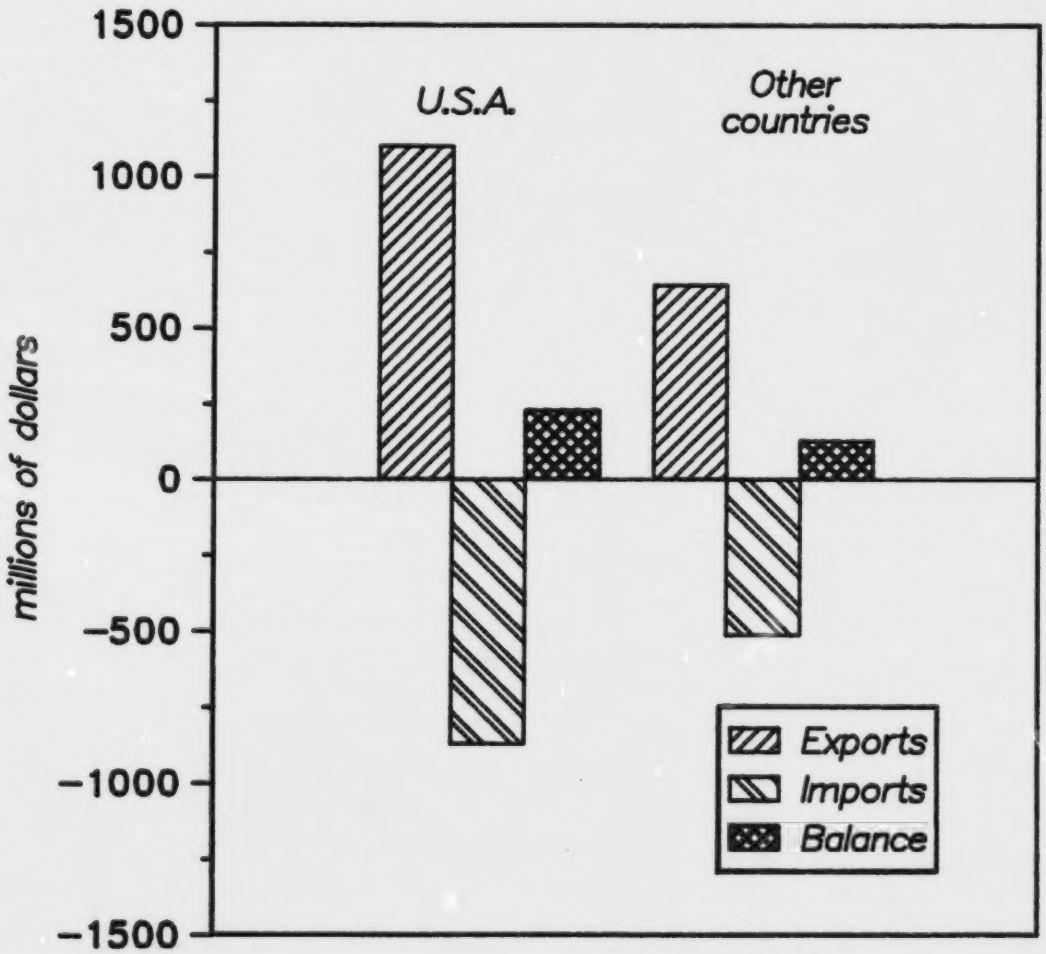
Source: Tables 1 and 2.

Fig. 3. Trade in Electronic Products, 1984



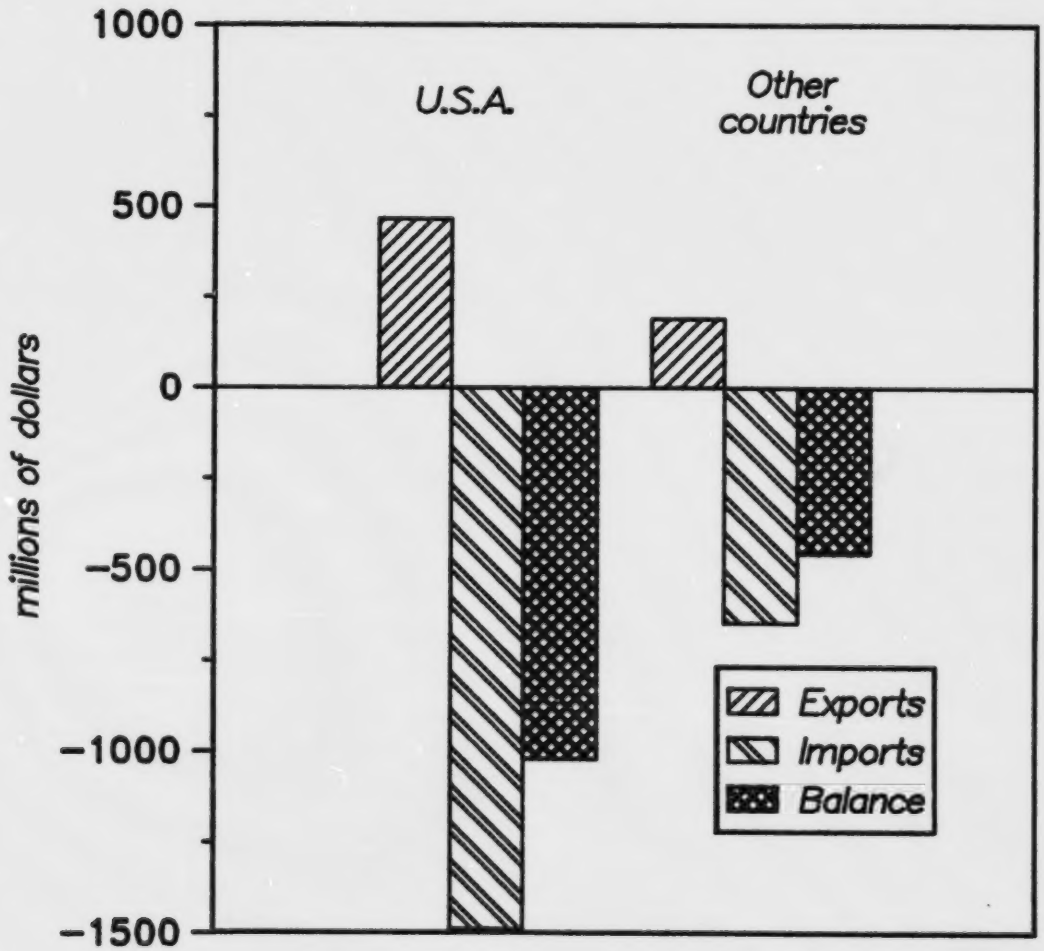
Source: Tables 1 and 2.

Fig. 4. Trade in Telecommunications Equipment, 1984



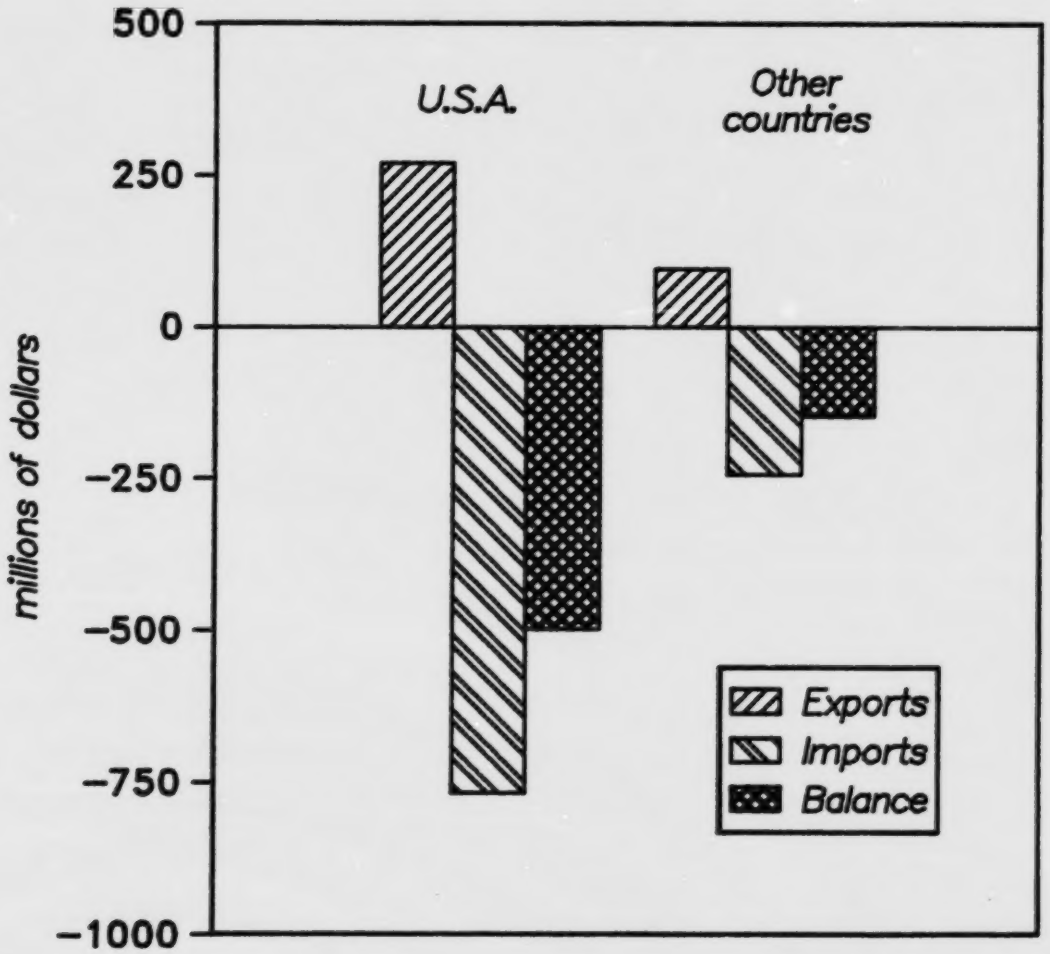
Source: Tables 1 and 2.

Fig. 5. Trade in Scientific Instruments, 1984



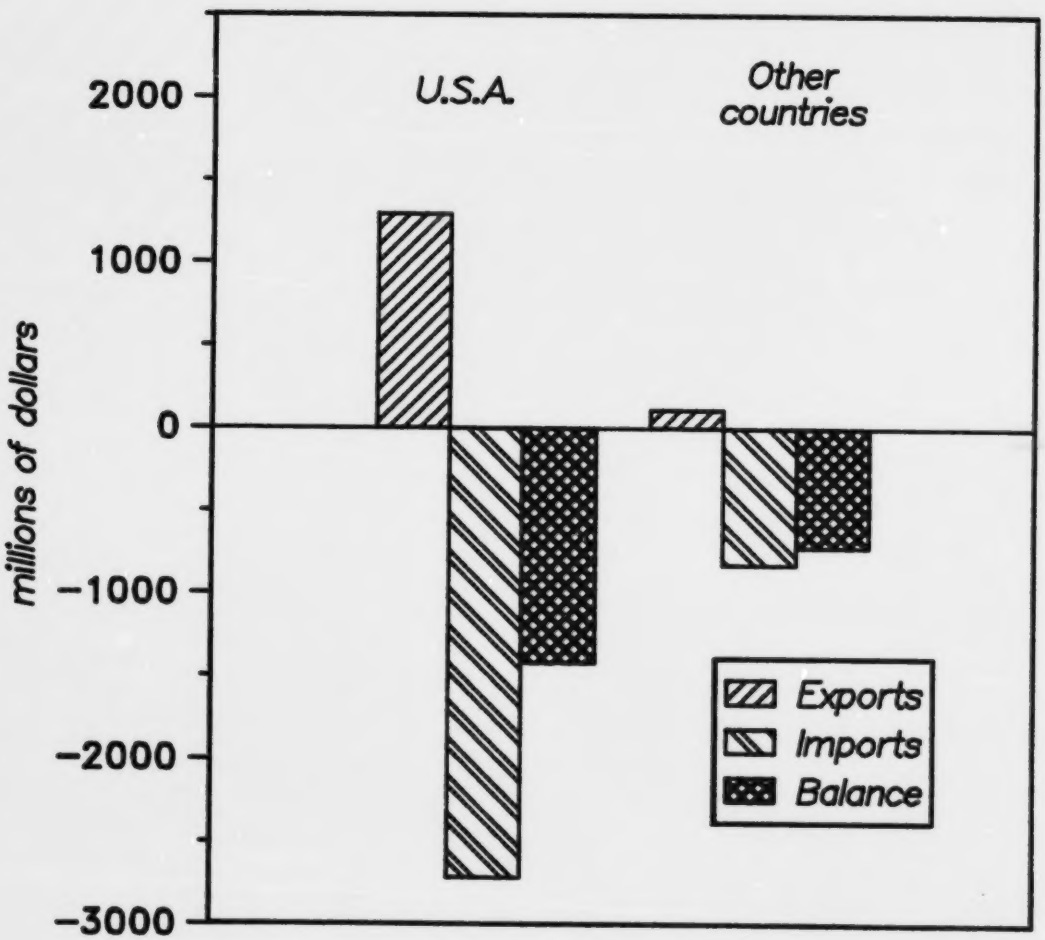
Source: Tables 1 and 2.

Fig. 6. Trade in Electrical Machinery, 1984



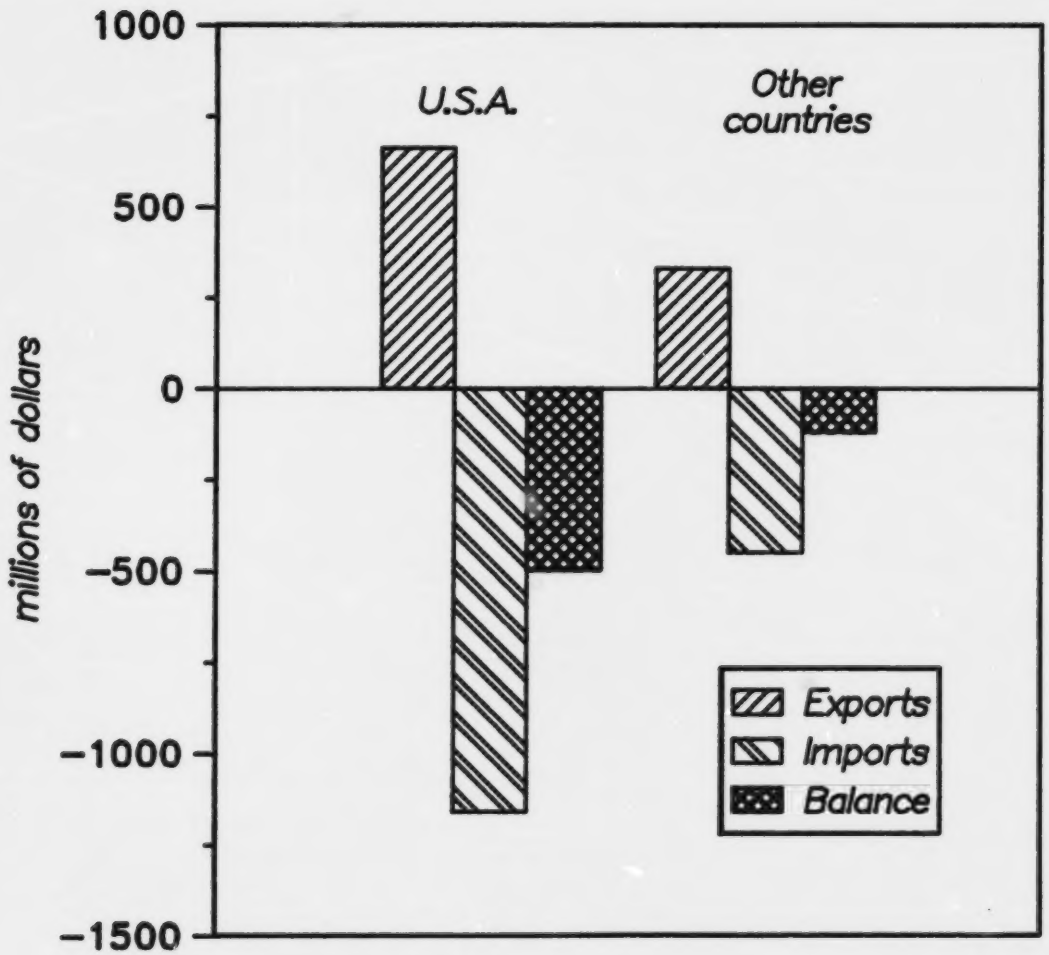
Source: Tables 1 and 2.

Fig. 7. Trade in Non-electrical Machinery, 1984



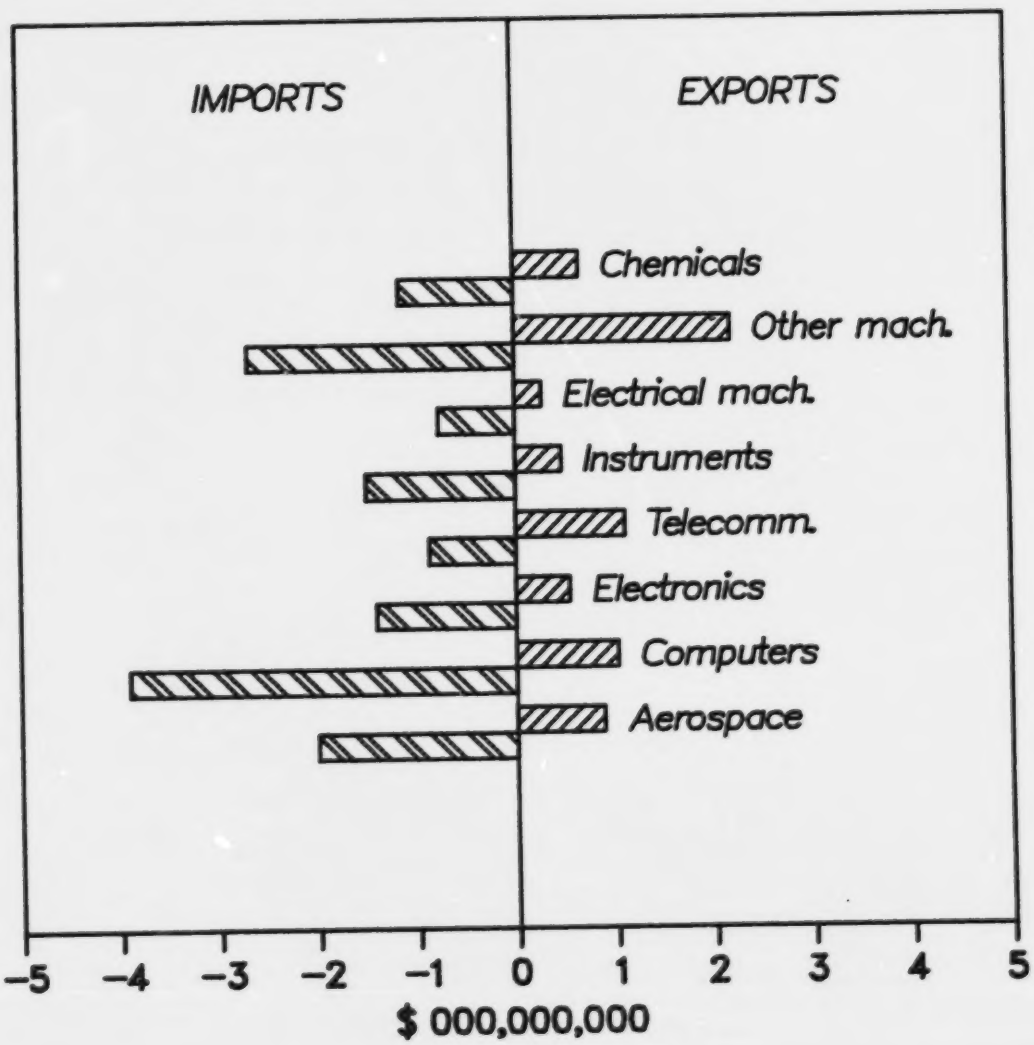
Source: Tables 1 and 2.

Fig. 8. Trade in Chemicals, 1984



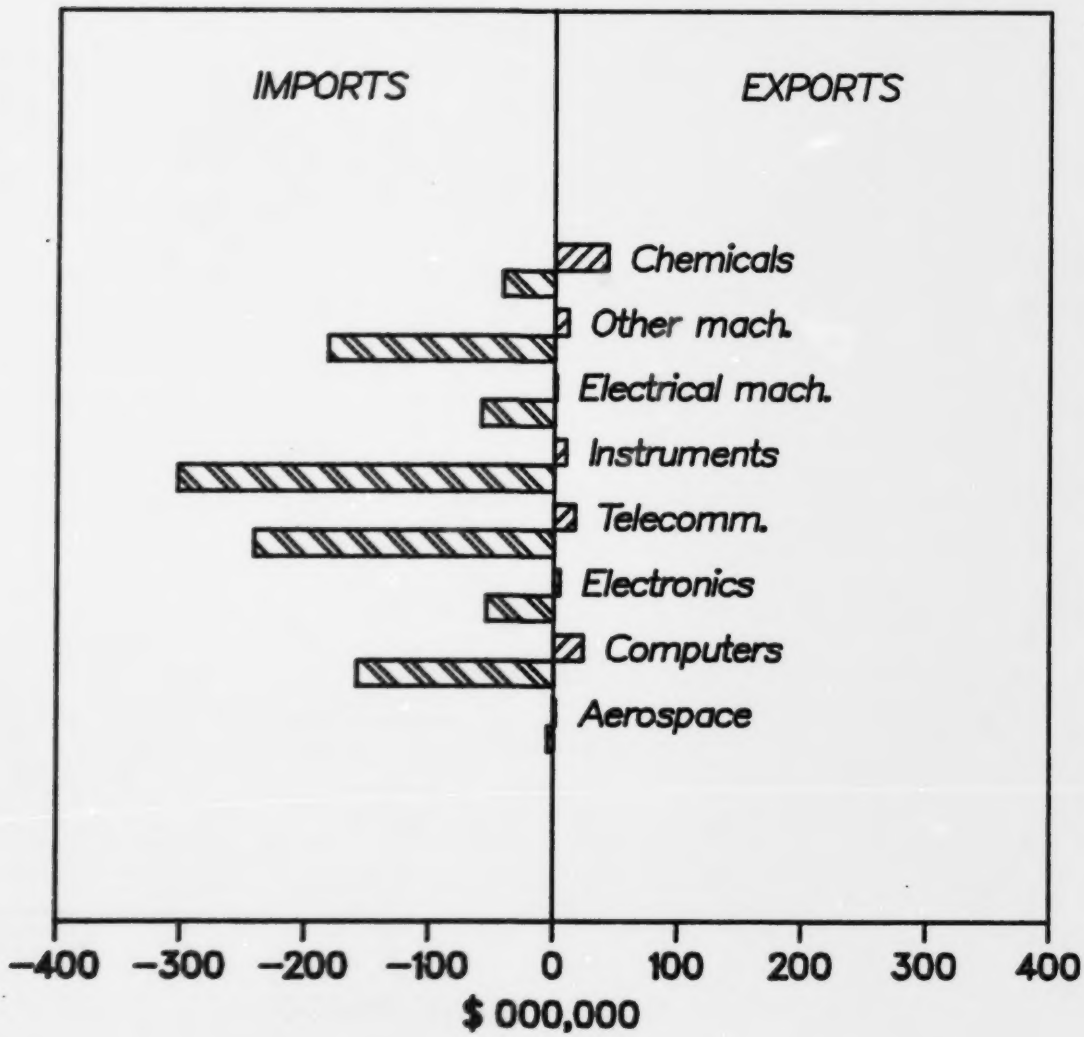
Source: Tables 1 and 2.

Fig. 9. Trade with the U.S.A., 1984



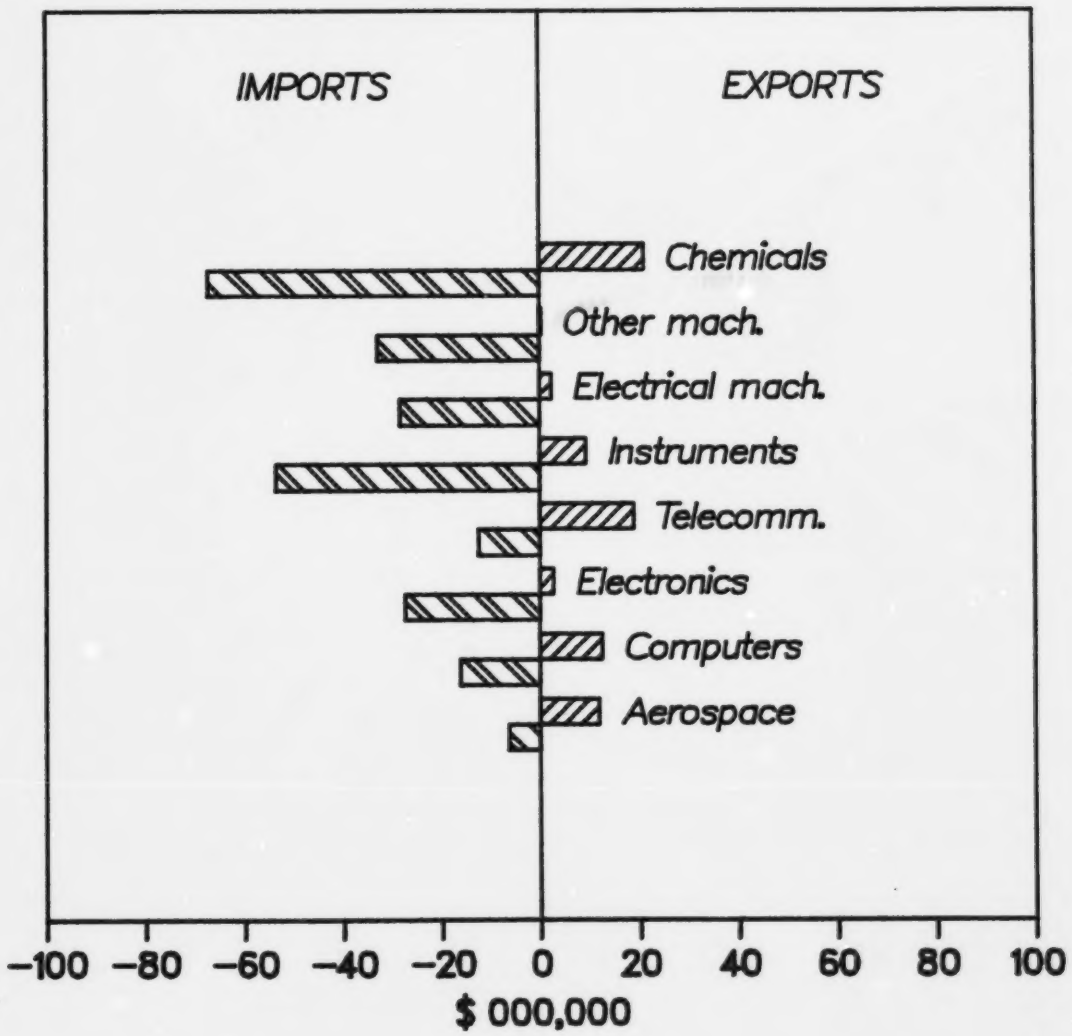
Source: Tables 1 and 2.

Fig. 10. Trade with Japan, 1984



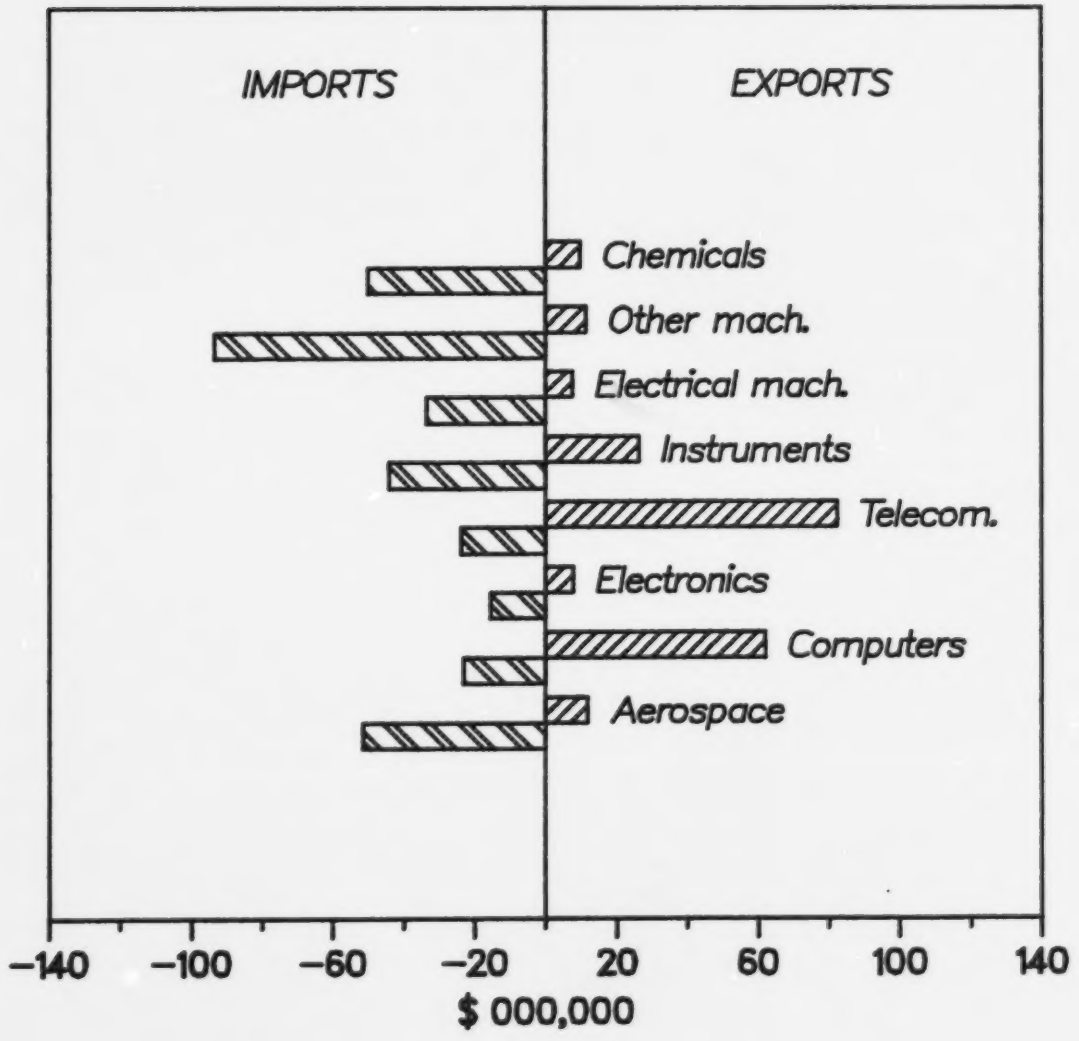
Source: Tables 1 and 2.

Fig. 11. Trade with the Federal Republic of Germany, 1984



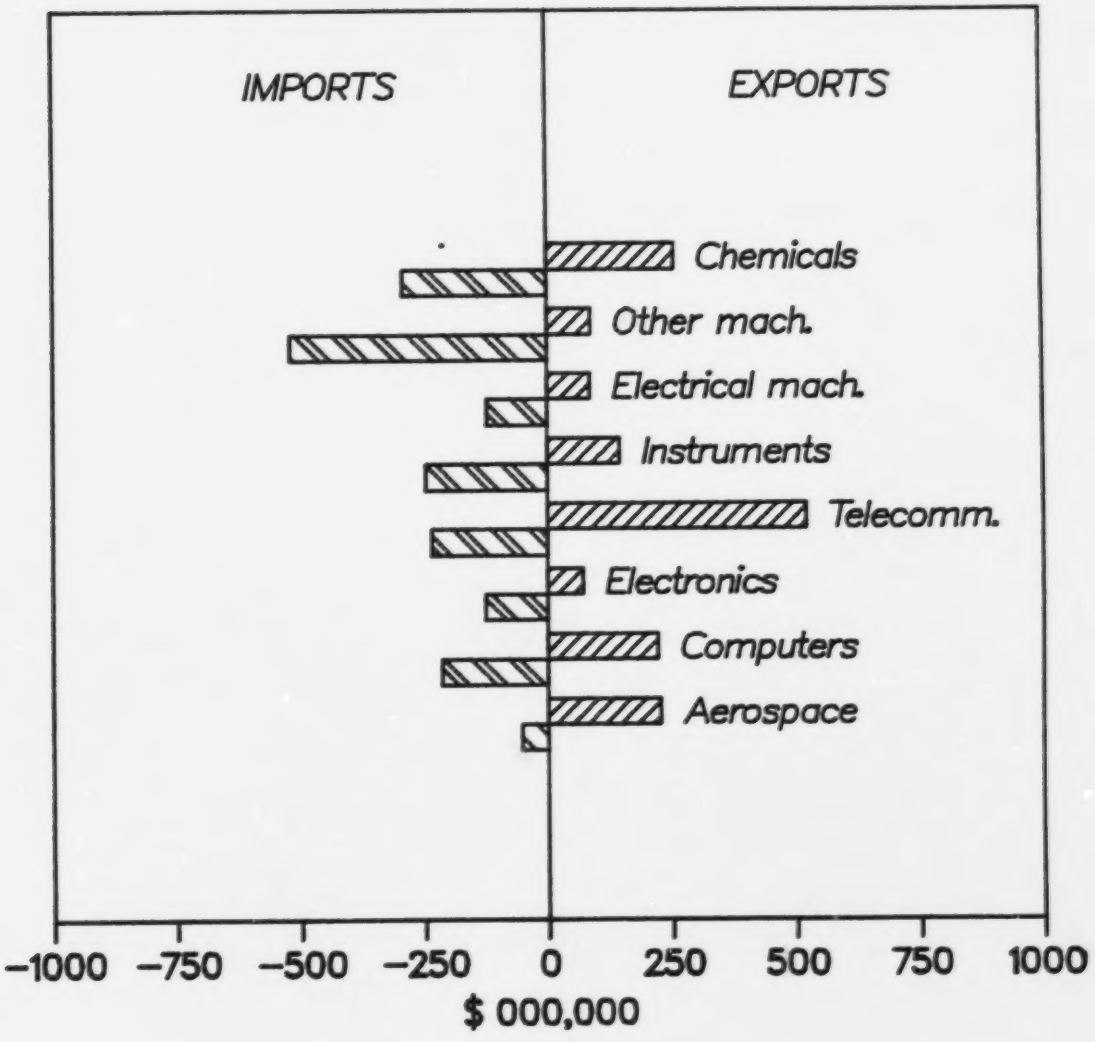
Source: Tables 1 and 2.

Fig. 12. Trade with the United Kingdom, 1984



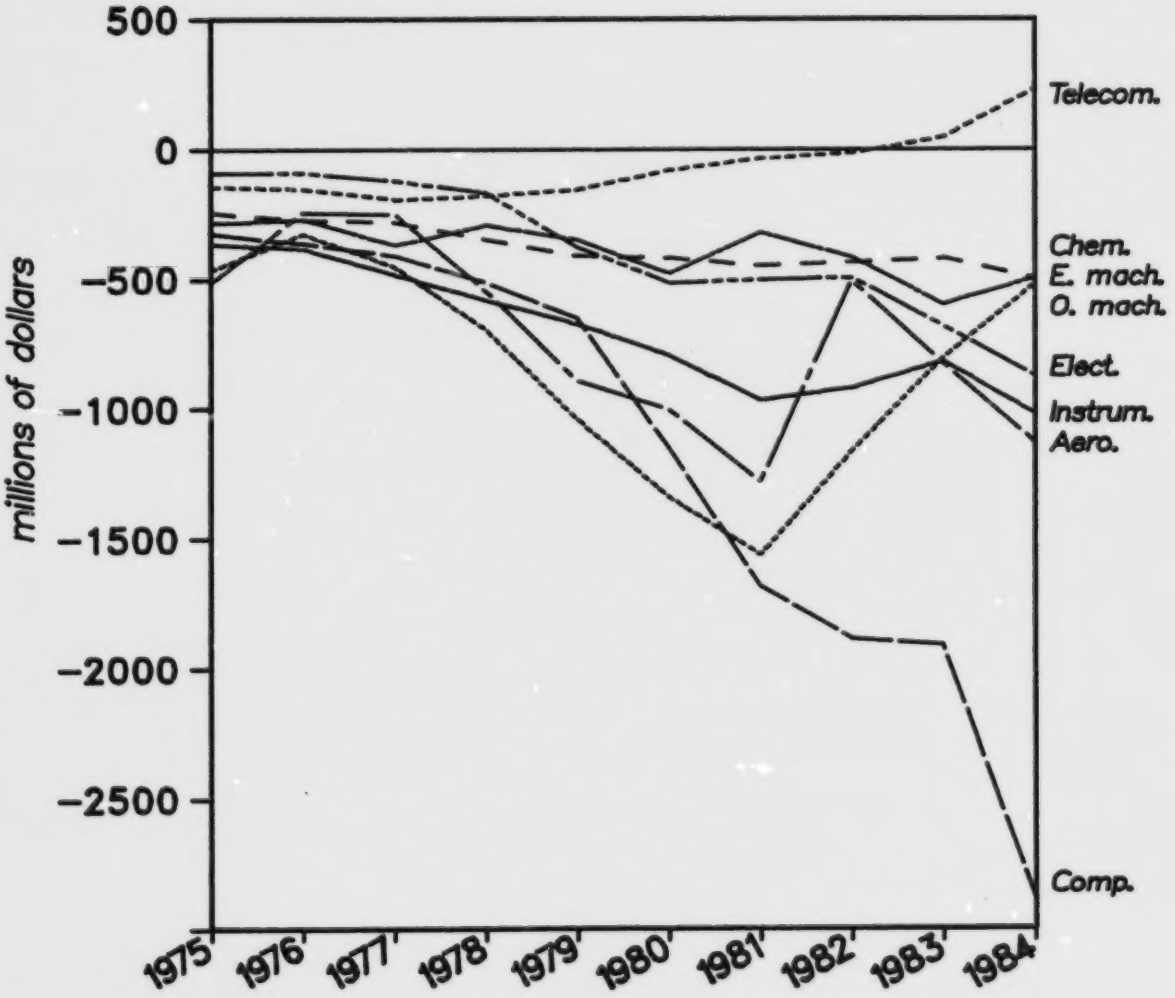
Source: Tables 1 and 2.

Fig. 13. Trade with Other Countries, 1984



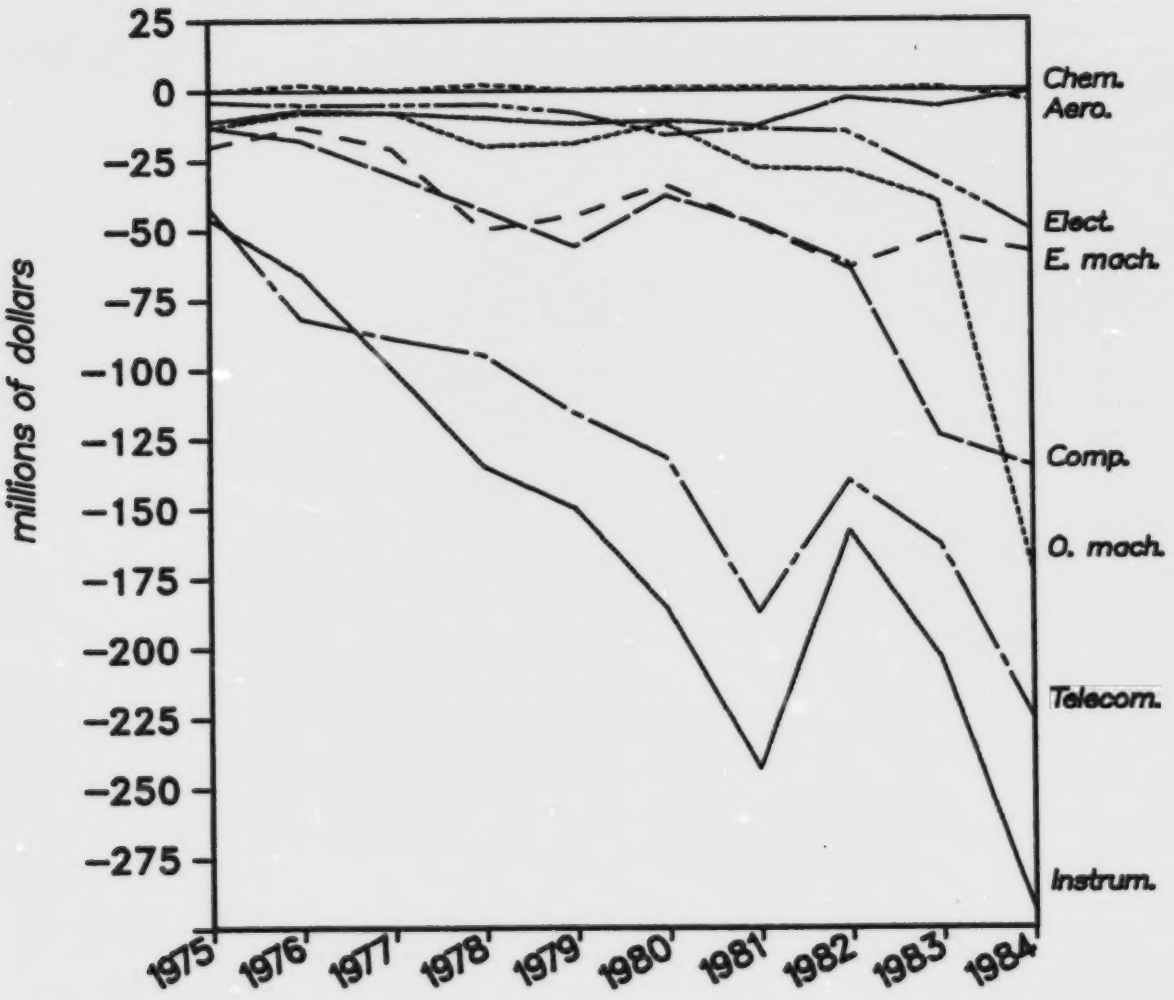
Source: Tables 1 and 2.

Fig. 14. Balance of Trade with the U.S.A., 1975–1984



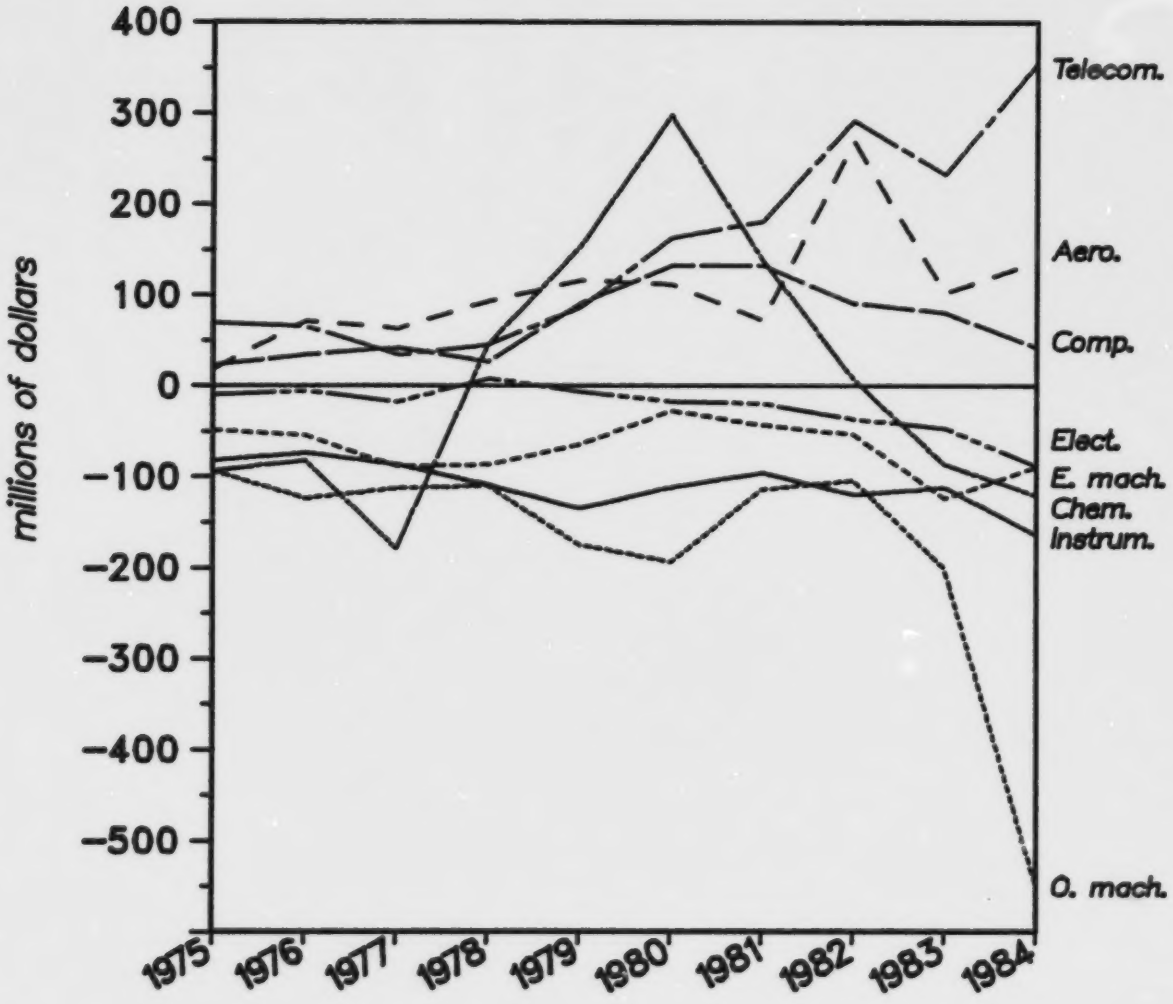
Source: Table 5.

Fig. 15. Balance of Trade with Japan, 1975–1984



Source: Table 8.

Fig. 16. Balance of Trade with Other Countries, 1975–1984



Source: Table 11.

TABLES

TABLE 1. Exports of "High-tech" Products from Canada, 1984

Country / Product Group	U.S.A.	Japan	F.R.G.	U.K.	France	Other	Total
	millions of dollars						
Aerospace Products	884.9	1.3	11.7	11.8	7.4	217.8	1,134.9
Computers and related equipment	1,022.5	23.2	12.5	61.8	24.8	195.7	1,340.5
Electronic equipment	545.7	4.2	2.7	7.7	16.0	54.0	630.3
Telecommunications equipment	1,099.9	16.8	18.9	82.3	6.0	516.7	1,740.6
Scientific instruments	466.4	9.3	9.3	26.2	16.5	128.4	656.1
Electrical machinery	270.3	0.7	2.3	7.5	1.7	83.7	366.2
Non-electrical machinery	2,196.5	10.4	0.3	11.2	-	86.7	2,305.1
Chemicals (including drugs)	662.4	42.5	21.0	9.7	32.6	224.5	992.7
TOTAL	7,148.6	108.4	78.7	218.2	105.0	1,507.5	9,166.4

Source: Statistics Canada, International Trade Division.

TABLE 2. Imports of "High-tech" Products by Canada, 1984

Product Group	Country						Total
	U.S.A.	Japan	F.R.G.	U.K.	France	Other	
	millions of dollars						
Aerospace Products	2,015.7	5.0	6.3	51.6	17.5	36.6	2,132.7
Computers and related equipment	3,904.5	157.9	16.2	23.0	7.4	206.5	4,315.5
Electronic equipment	1,421.4	54.0	27.3	15.6	15.8	110.5	1,644.6
Telecommunications equipment	870.1	241.7	12.4	23.7	4.5	229.4	1,381.8
Scientific instruments	1,488.5	303.0	53.5	44.2	27.1	219.5	2,135.8
Electrical machinery	767.9	58.8	28.4	33.5	26.1	97.1	1,011.8
Non-electrical machinery	2,716.9	182.3	32.9	93.4	1.5	519.1	3,546.1
Chemicals (including drugs)	1,159.7	41.7	67.3	50.2	25.2	266.1	1,610.2
TOTAL	14,344.7	1,044.4	244.3	335.2	125.1	1,684.8	17,778.5

Source: Statistics Canada, International Trade Division.

TABLE 3. Exports of "High-tech" Products to the U.S.A., 1975-1984

Product group	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
	millions of dollars									
Aerospace Products	149.6	131.8	162.3	226.3	402.7	674.9	803.9	835.2	849.6	884.9
Computers and related equipment	140.1	194.2	193.0	297.8	394.9	440.2	548.1	609.8	733.8	1,022.5
Electronic equipment	34.1	38.3	30.0	43.3	55.4	106.2	246.4	179.2	244.3	545.7
Telecommunications equipment	142.7	165.7	180.7	250.7	362.8	490.3	636.9	626.3	736.1	1,099.9
Scientific instruments	79.8	85.9	90.8	138.8	191.5	238.7	251.2	300.8	414.2	466.4
Electrical machinery	55.1	65.0	70.4	98.8	138.6	139.9	162.9	170.1	175.8	270.3
Non-electrical machinery	538.3	800.6	972.2	1,118.7	878.0	514.1	709.3	970.7	1,570.8	2,196.5
Chemicals (including drugs)	98.2	182.4	189.4	324.5	371.1	283.6	507.1	400.3	409.6	662.4
TOTAL	1,237.9	1,663.9	1,888.8	2,498.9	2,795.0	2,887.9	3,865.8	4,092.4	5,134.2	7,148.6

Source: Statistics Canada, International Trade Division.

TABLE 4. Imports of "High-tech" Products from the U.S.A., 1975-1984

Product group	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
	millions of dollars									
Aerospace	659.2	375.3	412.3	774.0	1,297.2	1,679.9	2,386.3	1,343.1	1,677.5	2,015.7
Computers and related equipment	465.2	558.3	602.9	811.9	1,047.4	1,594.6	2,232.0	2,495.4	2,644.1	3,904.5
Electronic equipment	123.3	129.1	153.3	211.7	433.8	622.2	750.7	676.2	928.8	1,421.4
Telecommunications equipment	287.5	319.8	376.0	430.9	518.8	572.2	674.2	643.3	691.6	870.1
Scientific instruments	446.9	470.7	575.8	721.8	867.1	1,035.7	1,220.6	1,223.3	1,232.7	1,488.5
Electrical machinery	300.9	338.1	353.8	447.9	551.1	561.6	662.6	608.1	597.3	767.9
Non-electrical machinery	1,005.3	1,128.4	1,427.1	1,816.6	1,919.5	1,856.5	2,273.1	2,136.0	2,375.7	2,716.9
Chemicals (including drugs)	381.4	453.0	560.4	618.5	722.4	764.3	829.4	818.4	1,008.4	1,159.7
TOTAL	3,669.7	3,772.7	4,461.6	5,833.3	7,357.3	8,687.0	10,728.9	9,943.8	11,156.1	14,344.7

Source: Statistics Canada, International Trade Division.

TABLE 5. Balance of Trade in "High-tech" Products with the U.S.A., 1975-1984

Product group	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
	millions of dollars									
Aerospace	-509.6	-243.5	-250.0	-547.6	-894.5	-1,005.0	-1,282.4	-507.9	-827.8	-1,130.8
Computers and related equipment	-325.1	-364.1	-409.9	-514.0	-652.5	-1,154.4	-1,683.9	-1,885.6	-1,910.2	-2,881.9
Electronic equipment	-89.2	-90.8	-123.3	-168.4	-378.3	-515.9	-504.3	-497.0	-684.5	-875.7
Telecommunications equipment	-144.8	-154.1	-195.3	-180.2	-156.0	-81.9	-37.3	-17.0	44.5	229.9
Scientific instruments	-367.1	-384.8	-485.0	-583.0	-675.7	-797.0	-969.4	-922.5	-818.6	-1,022.2
Electrical machinery	-245.8	-273.1	-283.5	-349.1	-412.5	-421.7	-499.6	-438.0	-421.6	-497.6
Non-electrical machinery	-467.0	-327.7	-454.9	-697.9	-1,041.5	-1,342.4	-1,563.8	-1,165.3	-804.9	-520.5
Chemicals (including drugs)	-283.2	-270.6	-370.9	-294.1	-351.3	-480.7	-322.3	-418.1	-598.8	-497.3
TOTAL	-2,431.8	-2,108.7	-2,572.8	-3,334.3	-4,562.3	-5,799.0	-6,863.0	-5,851.4	-6,021.9	-7,196.1

Source: Statistics Canada, International Trade Division.

TABLE 6. Exports of "High-tech" Products to Japan, 1975-1984

Product group	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
	millions of dollars									
Aerospace	0.2	1.7	0.4	2.0	1.0	2.1	3.3	1.1	1.7	1.3
Computers and related equipment	16.9	15.7	7.5	9.6	12.8	20.3	19.9	17.2	24.6	23.2
Electronic equipment	0.5	0.1	0.3	1.0	1.8	0.7	1.0	2.4	2.0	4.2
Telecommunications equipment	2.2	2.6	2.6	3.1	3.4	4.2	4.0	7.6	9.8	16.8
Scientific instruments	1.6	1.9	2.0	3.6	5.1	6.3	5.5	10.2	12.9	9.3
Electrical machinery	0.3	0.3	1.1	0.8	1.0	0.7	0.9	3.6	1.2	0.7
Non-electrical machinery	0.2	0.4	—	0.2	—	0.2	0.2	0.3	0.2	10.4
Chemicals (including drugs)	2.6	3.0	1.3	3.1	4.0	6.2	7.0	27.0	17.9	42.5
TOTAL	24.5	25.7	15.2	23.4	29.1	40.7	41.8	69.4	70.3	108.4

Source: Statistics Canada, International Trade Division.

TABLE 7. Imports of "High-tech" Products from Japan, 1975-1984

Product group	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
	millions of dollars									
Aerospace	0.2	0.2	0.1	0.2	1.1	1.7	2.1	1.4	1.3	5.0
Computers and related equipment	29.8	33.4	35.0	52.4	68.2	58.4	67.8	79.5	148.3	157.9
Electronic equipment	4.8	5.4	4.9	6.3	9.3	16.6	15.5	17.5	34.3	54.0
Telecommunications equipment	43.8	84.6	91.2	98.3	120.0	135.9	191.0	148.1	173.1	241.7
Scientific instruments	47.4	67.8	101.9	138.4	154.9	192.3	248.2	168.6	217.5	303.0
Electrical machinery	20.3	13.4	21.7	50.6	46.1	34.9	49.5	67.8	53.1	58.8
Non-electrical machinery	13.5	8.1	8.2	20.0	18.6	12.0	27.9	29.5	40.5	182.3
Chemicals (including drugs)	13.8	9.5	9.8	13.3	15.5	17.7	20.0	23.6	23.3	41.7
TOTAL	173.6	222.4	272.8	379.5	433.7	469.5	622.0	536.0	691.4	1,044.4

Source: Statistics Canada, International Trade Division.

TABLE 8. Balance of Trade in "High-tech" Products with Japan, 1975-1984

Product group	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
	millions of dollars									
Aerospace	—	1.5	0.2	1.9	-0.1	0.4	1.2	-0.3	0.4	-3.6
Computers and related equipment	-12.9	-17.7	-27.5	-42.9	-55.5	-38.1	-47.9	-62.3	-123.7	-134.7
Electronic equipment	-4.3	-5.3	-4.6	-5.3	-7.5	-15.9	-14.5	-15.1	-32.3	-49.9
Telecommunications equipment	-41.7	-81.9	-88.6	-95.2	-116.6	-131.7	-187.0	-140.4	-163.3	-224.9
Scientific instruments	-45.8	-65.8	-99.9	-134.8	-149.8	-186.0	-242.7	-158.4	-204.5	-293.7
Electrical machinery	-20.0	-13.1	-20.6	-49.7	-45.1	-34.2	-48.6	-64.2	-51.9	-58.1
Non-electrical machinery	-13.3	-7.7	-8.2	-19.8	-18.6	-11.9	-27.7	-29.2	-40.3	-171.9
Chemicals (including drugs)	-11.1	-6.6	-8.4	-10.2	-11.5	-11.4	-13.0	-3.3	-5.5	0.9
TOTAL	-149.1	-196.6	-257.6	-356.0	-404.7	-428.8	-580.2	-466.6	-621.1	-935.9

Source: Statistics Canada, International Trade Division.

TABLE 9. Exports of "High-tech" Products to Other Countries, 1975-1984

Product group	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
	millions of dollars									
Aerospace	61.6	105.6	96.9	154.1	192.1	237.3	281.8	392.9	181.7	248.7
Computers and related equipment	88.1	84.8	88.0	98.3	168.0	221.5	242.2	229.7	244.6	294.8
Electronic equipment	25.5	27.9	25.2	47.0	48.5	61.2	54.4	40.6	49.8	80.4
Telecommunications equipment	126.8	142.3	121.1	136.7	208.9	293.8	349.9	454.9	454.7	623.9
Scientific instruments	61.1	59.8	62.6	78.8	106.8	140.8	166.9	129.2	154.3	180.4
Electrical machinery	62.2	62.4	55.7	61.3	108.3	126.1	120.4	114.1	72.8	95.2
Non-electrical machinery	57.7	34.4	43.2	50.9	62.4	50.4	89.6	87.7	77.9	98.2
Chemicals (including drugs)	45.8	68.9	54.5	268.8	457.6	615.6	498.2	367.7	287.4	287.8
TOTAL	528.8	586.1	547.2	895.9	1,352.6	1,746.7	1,803.4	1,816.8	1,523.2	1,909.4

Source: Statistics Canada, International Trade Division.

TABLE 10. Imports of "High-tech" Products from Other Countries, 1975-1984

Product group	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
	millions of dollars									
Aerospace	42.4	34.5	33.8	60.8	77.1	125.9	209.9	123.8	80.2	112.0
Computers and related equipment	64.9	51.1	45.8	72.6	78.1	89.9	109.9	140.0	164.4	253.2
Electronic equipment	35.2	33.5	34.4	38.6	55.9	79.3	74.1	77.2	97.2	169.2
Telecommunications equipment	57.4	77.6	86.9	91.3	122.9	131.7	168.7	163.3	222.5	270.0
Scientific instruments	142.9	133.7	149.5	187.6	241.8	252.5	262.8	249.1	266.2	344.3
Electrical machinery	111.4	117.3	144.3	148.1	173.4	154.6	164.7	168.0	196.7	185.1
Non-electrical machinery	151.8	158.6	156.4	160.8	237.0	244.0	203.7	191.8	279.1	646.9
Chemicals (including drugs)	139.2	151.4	233.4	223.8	305.1	317.1	360.3	360.4	374.5	408.7
TOTAL	745.2	757.7	884.5	983.6	1,291.3	1,395.0	1,554.1	1,473.6	1,680.8	2,389.4

Source: Statistics Canada, International Trade Division.

TABLE 11. Balance of Trade in "High-tech" Products with Other Countries, 1975-1984

Product group	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
	millions of dollars									
Aerospace	19.2	71.0	63.1	93.2	116.0	111.3	71.9	269.1	101.5	136.7
Computers and related equipment	23.1	33.7	42.2	25.7	90.0	131.6	132.3	89.6	80.2	41.6
Electronic equipment	-9.7	-5.7	-9.2	8.4	-7.3	-18.1	-19.7	-36.6	-47.4	-88.8
Telecommunications equipment	69.4	64.7	34.1	45.4	86.1	162.1	181.2	291.6	232.2	353.9
Scientific instruments	-81.8	-73.9	-86.5	-108.8	-135.0	-111.7	-95.9	-119.9	-111.9	-163.9
Electrical machinery	-49.2	-54.8	-88.5	-86.9	-65.2	-28.5	-44.3	-53.8	-123.8	-89.9
Non-electrical machinery	-94.0	-124.2	-113.2	-109.9	-174.7	-193.6	-114.1	-104.1	-201.2	-348.6
Chemicals (including drugs)	-93.4	-82.4	-178.9	45.2	152.4	298.5	137.9	7.3	-87.1	-121.0
TOTAL	-216.4	-171.6	-336.9	-87.7	62.3	351.6	249.3	343.2	-157.5	-480.0

Source: Statistics Canada, International Trade Division.

TABLE 12. Total Exports of "High-tech" Products, 1975-1984

Product group	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
	millions of dollars									
Aerospace	211.4	239.1	259.6	382.4	595.8	914.3	1,089.0	1,229.2	1,033.0	1,134.9
Computers and related equipment	245.1	294.7	288.5	405.7	575.7	682.0	810.2	856.7	1,003.0	1,340.5
Electronic equipment	60.1	66.3	55.5	91.3	105.7	168.1	301.8	222.2	296.1	630.3
Telecommunications equipment	271.7	310.6	304.4	390.5	575.1	788.3	990.8	1,088.8	1,200.6	1,740.6
Scientific instruments	142.5	147.6	155.4	221.2	303.4	385.8	423.6	440.2	581.4	656.1
Electrical machinery	117.6	127.7	127.2	160.9	247.9	266.7	284.2	287.8	249.8	366.2
Non-electrical machinery	596.2	835.4	1,015.4	1,169.8	940.4	564.7	799.1	1,058.7	1,648.9	2,305.1
Chemicals (including drugs)	146.6	254.3	245.2	596.4	832.7	905.4	1,012.3	795.0	714.9	992.7
TOTAL	1,791.2	2,275.7	2,451.2	3,418.2	4,176.7	4,675.3	5,711.0	5,978.6	6,727.7	9,166.4

Source: Statistics Canada, International Trade Division.

TABLE 13. Total Imports of "High-tech" Products , 1975-1984

Product group	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
	millions of dollars									
Aerospace	701.8	410.0	446.2	835.0	1,375.4	1,807.5	2,298.3	1,468.3	1,759.0	2,132.7
Computers and related equipment	559.9	642.8	683.7	936.9	1,193.7	1,742.9	2,409.7	2,714.9	2,956.8	4,315.6
Electronic equipment	163.3	168.0	192.6	256.6	499.0	718.1	840.3	770.9	1,060.3	1,644.6
Telecommunications equipment	388.7	482.0	554.1	620.5	761.7	839.8	1,033.9	954.7	1,087.2	1,381.8
Scientific instruments	637.2	672.2	827.2	1,047.8	1,263.8	1,480.5	1,731.6	1,641.0	1,716.4	2,135.8
Electrical machinery	432.6	468.8	519.8	646.6	770.6	751.1	876.8	843.9	847.1	1,011.8
Non-electrical machinery	1,170.6	1,295.1	1,591.7	1,997.4	2,175.1	2,112.5	2,504.7	2,357.3	2,695.3	3,546.1
Chemicals (including drugs)	534.4	613.9	803.6	855.6	1,043.0	1,099.1	1,209.7	1,202.4	1,406.2	1,610.1
TOTAL	4,588.5	4,752.8	5,618.9	7,196.4	9,082.3	10,551.5	12,905.0	11,953.4	13,528.3	17,778.5

Source: Statistics Canada, International Trade Division.

TABLE 14. Total Balance of Trade of "High-tech" Products, 1975-1984

Product group	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
	millions of dollars									
Aerospace	-490.4	-171.0	-186.7	-452.5	-778.6	-893.3	-1,209.7	-239.1	-723.9	-997.7
Computers and related equipment	-314.9	-348.1	-395.2	-531.2	-618.0	-1,060.9	-1,599.5	-1,858.3	-1,983.7	-2,970.0
Electronic equipment	-103.2	-101.8	-137.1	-165.3	-393.1	-549.9	-538.5	-546.7	-784.2	-1,014.4
Telecommunications equipment	-117.1	-171.3	-249.8	-230.0	-186.5	-51.5	-43.1	134.2	113.4	358.9
Scientific instruments	-494.7	-524.5	-671.4	-826.6	-960.5	-1,094.7	-1,308.0	-1,200.8	-1,135.0	-1,479.8
Electrical machinery	-315.0	-341.0	-392.6	-485.7	-522.8	-484.4	-592.5	-556.0	-597.3	-845.6
Non-electrical machinery	-574.3	-459.6	-576.3	-827.6	-1,234.8	-1,547.9	-1,705.6	-1,298.6	-1,046.4	-1,241.0
Chemicals (including drugs)	-387.7	-359.6	-558.2	-259.1	-210.4	-193.6	-197.4	-407.3	-691.4	-617.4
TOTAL	**-2,797.3**	**-2,476.9**	**-3,167.3**	**-3,778.0**	**-4,904.7**	**-5,876.2**	**-7,193.9**	**-5,974.8**	**-6,800.5**	**-8,612.0**

Source: Statistics Canada, International Trade Division.

ANNEX

LIST OF HIGH R&D INTENSIVE PRODUCTS

PRODUCT	SITC No.
Aerospace	
Internal combustion engines for aircraft	711.41
Jet and gas turbines for aircraft	711.42
Aircraft hulls	734
Automatic data processing machines and units	
Computers	714.2
Peripheral units	714.3
Electronic equipment	
Electronic apparatus for medical purposes	726.1
X-ray apparatus	726.2
Valves, tubes, transistors, semiconducators and other electronic components	729.3
Telecommunications equipment	
Electrical line telephone and telegraph equipment	724.91
Microphones, loudspeakers, amplifiers	724.92
Other telecommunications equipment, including satellites	724.99
Drugs	
Vitamins and provitamins	541.1
Penicillin, streptomycin and other antibiotics	541.3
Vegetable alkaloids, their salts and other derivatives	541.4
Hormones	541.5
Glycocides, sera, vaccines, etc.	541.6

LIST OF HIGH R&D INTENSIVE PRODUCTS - Concluded

PRODUCT	SITC No.
Scientific instruments	
Electrical measuring and controlling instruments	729.5
Electron and proton accelerators	729.7
Binoculars, microscopes, telescopes	861.3
Photographic cameras and flashlight apparatus	861.4
Cinematographic cameras, projectors, sound recorders and sound reproducers	861.5
Photographic equipment n.d.a.	861.6
Medical instruments (excl. electromedical)	861.71
Surveying instruments	861.91
Watches and clocks	864
Photocopying apparatus	714.91
Electrical machinery	
Electrical power machinery	722.1
Apparatus for electrical circuits	722.2
Electromagnetic appliances	729.91
Electric traffic control equipment	729.93
Electric sound or visual signalling apparatus n.d.a.	729.94
Non-electrical machinery	
Steam engines and steam turbines	711.3
Internal combustion engines (not for aircraft)	711.5
Gas turbines (not for aircraft)	711.6
Nuclear reactors	711.7
Water turbines and other water engines	711.81
Chemicals	
Radioactive and associated materials	515
Synthetic organic dyestuffs and natural indigo	531
Insecticides, fungicides, disinfectants	599.2
Products of polymerization and copolymerization	581.2

Volume

3

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PART 3

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INTRODUCTION

There are many reasons for international trade. A pattern of exports or imports of a product may be caused by a number of factors or combinations of factors, ranging from climatic and soil conditions, to traditional crafts, to government decree. One reason for the trade pattern in certain products is their technological quality, or the quality of the technology necessary to produce them. These are the 'high-tech' products which are the subject of so much interest these days.

In Technology and Trade Statistics: Part 1, all internationally traded commodities were considered, using a classification originally developed at the Ministry of State for Science and Technology. In this paper, only certain groups of 'high-tech' products will be examined. These products are generally comparable to those classified as high-technology products in the earlier paper.

A common definition of "high-tech" products does not exist. In 1984, two committees of the Organization for Economic Cooperation and Development (OECD) agreed that such products possess five characteristics:

- high dependence on a strong technology base and a vigourous R&D effort;

- considerable strategic significance for governments;

- long lead-times from basic research to industrial application, short-lead times in commercialization, and accelerated obsolescence under the competitive pressure of new product and process introductions;

- high risks and large capital investments; and

- high degree of international co-operation and competition in R&D, production and worldwide marketing.(1)

None of these suggested characteristics are easy to quantify and, so far, the R&D effort has been the basic criterion for selection. The statistics contained in this paper(2) have been chosen on the basis of the ratio of R&D expenditures to the value of output for major manufacturing industry groups in 11 major OECD countries. The formula used is reproduced in the Technical Note section.

For 1960, the R&D intensities of the selected manufacturing industries were:

Industry group	ISIC class	R&D intensity
		HIGH
Aerospace	3845	22.7
Office machines, computers	3825	17.5
Electronic components	3832	10.4
Drugs and medicines	3522	8.7
Scientific instruments	385	4.8
Electrical machinery	383 less 3832	4.4
		MEDIUM
Motor vehicles	3843	2.7
Chemicals	351/352 less 3522	2.3
Other manufacturing industries	390	1.8
Non-electrical machinery	382 less 3825	1.6
Rubber, plastics	355/356	1.2
Non-ferrous metals	372	1.0
		LOW
Stone, clay, glass	361/362/369	0.9
Food, beverages, tobacco	311/312/313/314	0.8
Shipbuilding	3841	0.6
Petroleum refineries	353/354	0.6
Ferrous metals	371	0.6
Fabricated metal products	381	0.4
Paper, printing	341/342	0.3
Wood, cork, furniture	331/332	0.3
Textiles, footwear, leather	321/322/323/324	0.2

In this paper, several of the indicators from the second OECD report are presented for products of four of the high R&D-intensity industries listed above. In order to provice trade and production statistics, the products of these industries were identified, using a conversion key developed at the World Bank.(3)

The four industries are: electronic components, drugs and medicines, scientific instruments and electrical machinery. Office machines and calculators were not included because no Canadian production was shown: aerospace was not included because trade data were available only for a few countries. The indicators selected are: national production in 1980 for products of these industries (measured in current U.S. dollars), changes in this production from 1970-1980 (indexed to 1970), the proportion of domestic production which is exported, from 1970-1980, import penetration from 1970-1980 and apparent comparative advantage in 1982.

Import penetration is the share of domestic demand satisfied by imports. It is equal to the ratio of imports of products of an industry to domestic demand for these products, domestic demand being equal to production minus net exports. The formula used is reproduced in the Technical Notes.

Apparent comparative advantage compares the structure of exports of an industry in one country with the structure of exports of the same industry for the 11 OECD countries together. A comparative advantage of more than one indicates that the exports of products of an industry accounts for a larger proportion of a country's total manufacturing exports than for the 11 countries as a whole, i.e., that country's industry has an apparent comparative advantage. Since only trade statistics are used, more recent statistics are available (1982 compared to production statistics for 1980).

The formula is also shown in the Technical Notes.

These indicators are reproduced as illustrations of the material which may be available for analysis of trends and patterns in Canadian technology. Since these international statistics are not timely, the situation suggested by the tables and charts which follow may no longer be relevant.

FOUR "HIGH-TECHNOLOGY" INDUSTRIES

Electronic components

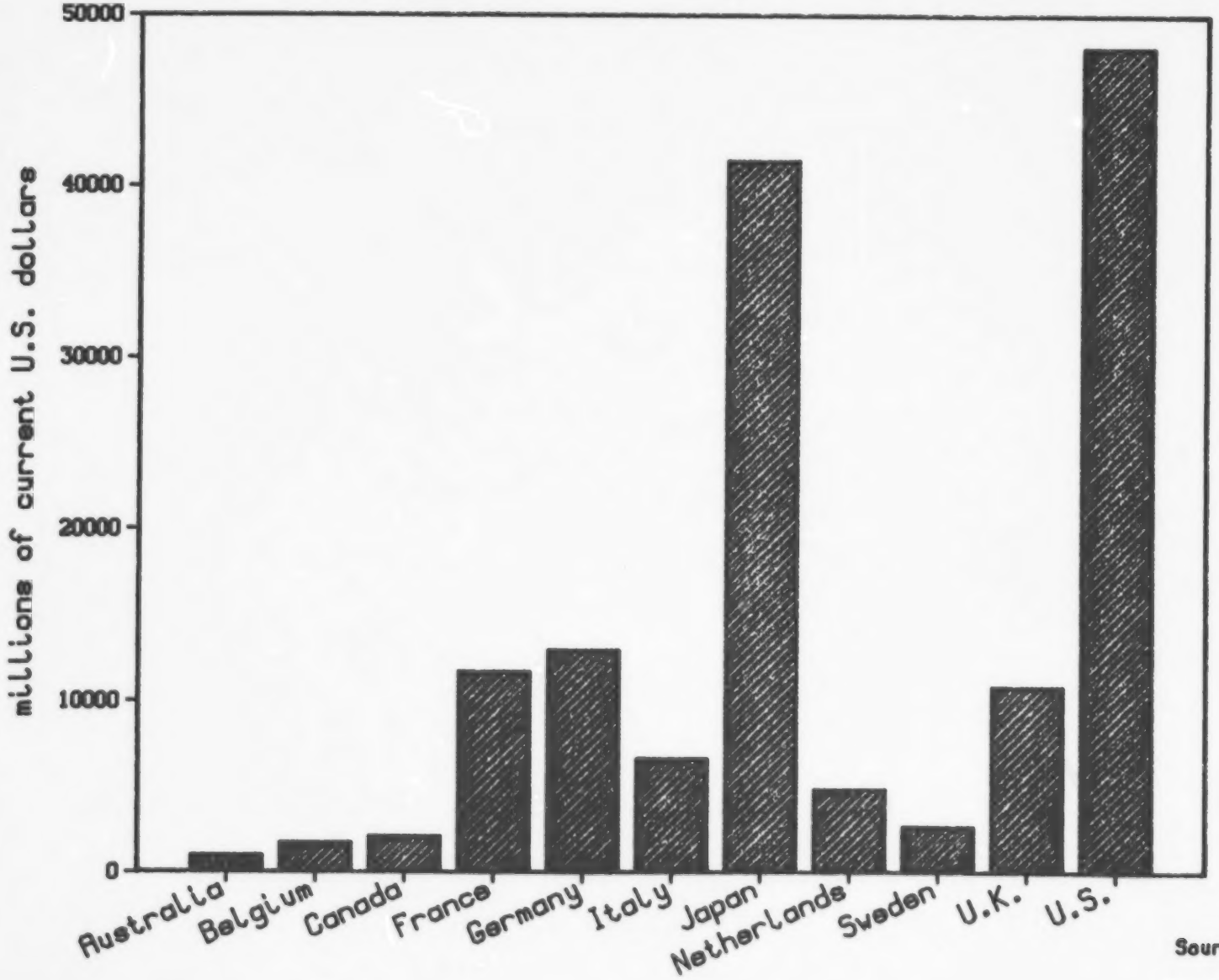
> The manufacture of radio and television receiving sets, sound reproducing and recording equipment, including public address systems, gramophones, dictating machines and tape recorders; gramophone records and pre-recorded magnetic tapes; wire and wireless telephone and telegraph equipment; radio and television transmitting, signalling, and detection equipment and apparatus; radar equipment and installations; parts and supplies specially used for electronic apparatus classified in this group; semi-conductor and related sensitive semi-conductor devices; fixed and variable electronic capacitors and condensers; radiographic, fluoroscopic and other X-ray apparatus and tubes.(4)

As can be seen in Figure 1, Canada is a minor producer (on the international scale) of electronic components. The world market is dominated by U.S. and Japanese output. Figure 2 shows how the production of countries other than the "giants" has developed. From 1970-1980, Canadian production increased less than that of any of the other countries shown.(5) For example, in 1970, the value of Swedish output of electronic components was about half that of Canadian production; in 1980, Swedish output was 25% greater than Canadian.

Figures 3 and 4 show that, except for Australia, and, to some extent, Canada, export ratios and import penetration ratios tend to be similar in magnitude, indicating specialization within the types of products manufactured by the electronic component industries. For Canada, comparison of the two ratios with output shows that the value of imports was almost 2 1/2 times greater than the value of exports in 1980. In that year, four of the countries displayed had positive export/import ratios: Belgium, Germany, the Netherlands and Sweden.

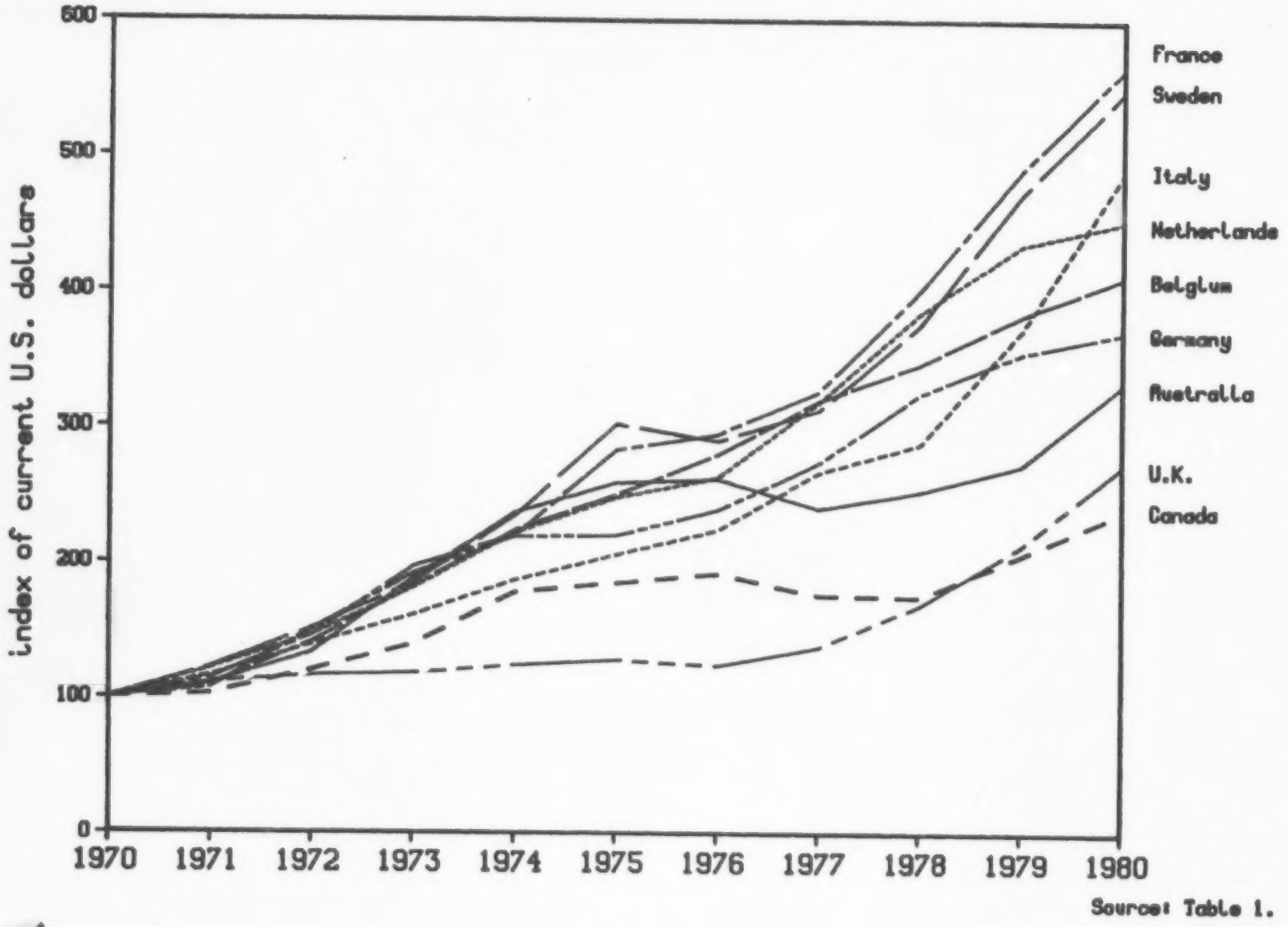
In Figure 5, the Japanese comparative advantage is apparent, with the U.S.A. being the only other country with a revealed comparative advantage greater than one for these products. Although Canada had one of the lower comparative advantages in 1982, Table 4 shows that it is one of the few countries which may have an increasing advantage in electronic components.

Fig. 1. Production of Electronic Components, 1980



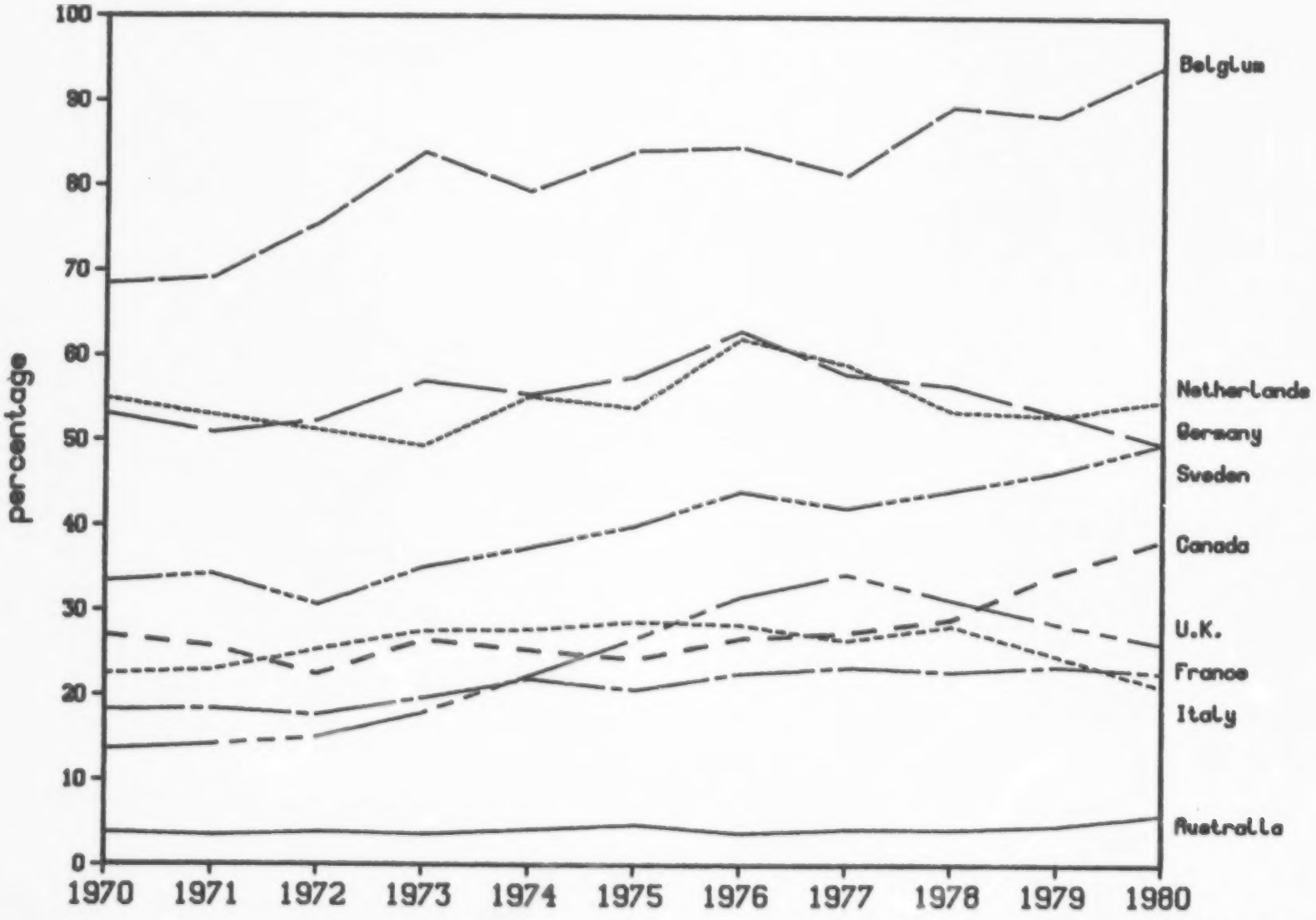
Source: Table 1.

Fig. 2. Production of Electronic Components, 1970-1980



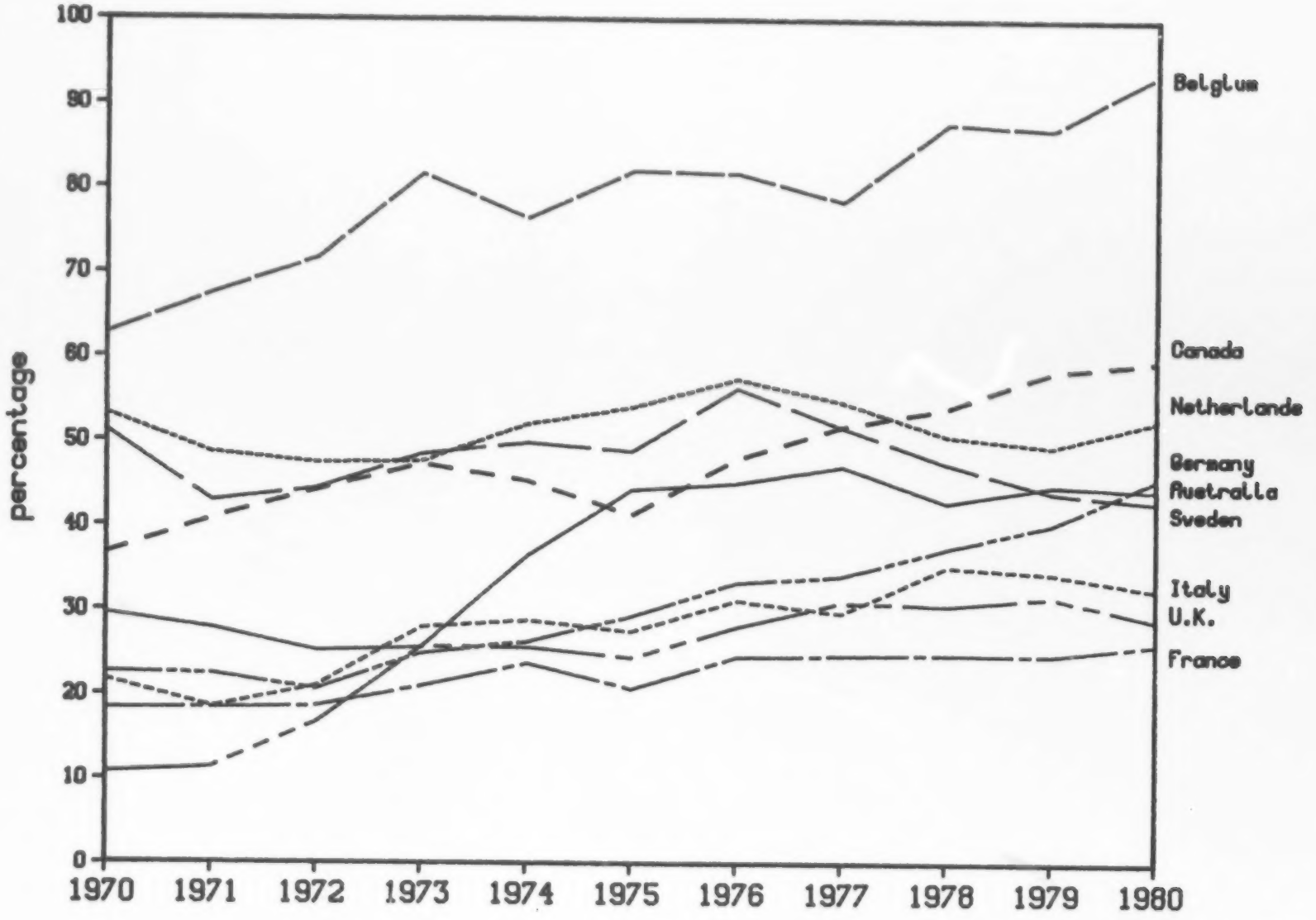
Source: Table 1.

Fig. 3. Export Share of Production of Electronic Components, 1970-1980



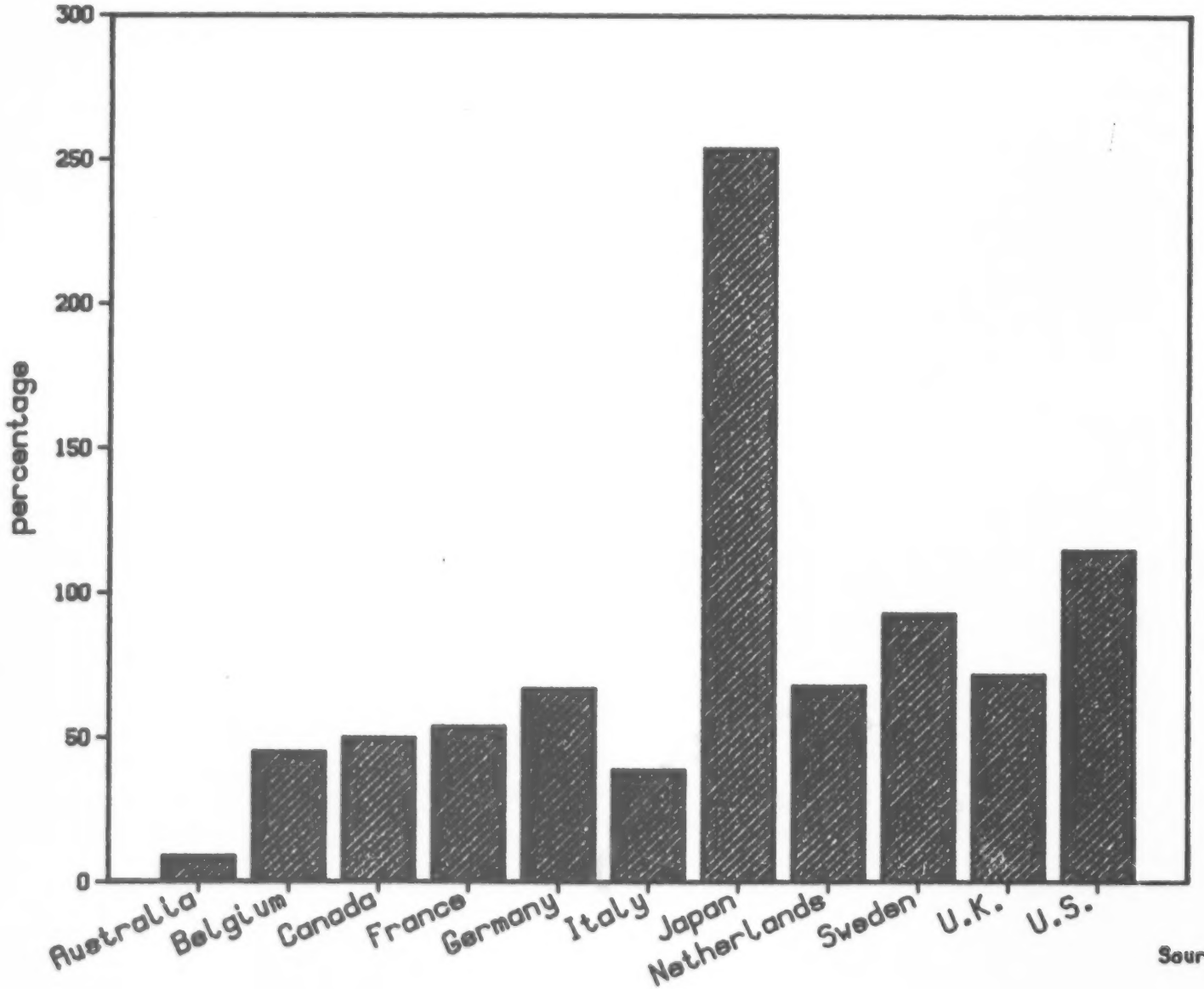
Source: Table 2.

Fig. 4. Import Penetration of Electronic Components, 1970-1980



Source: Table 3.

Fig. 5. Comparative Advantage for Electronic Components, 1982



Source: Table 4.

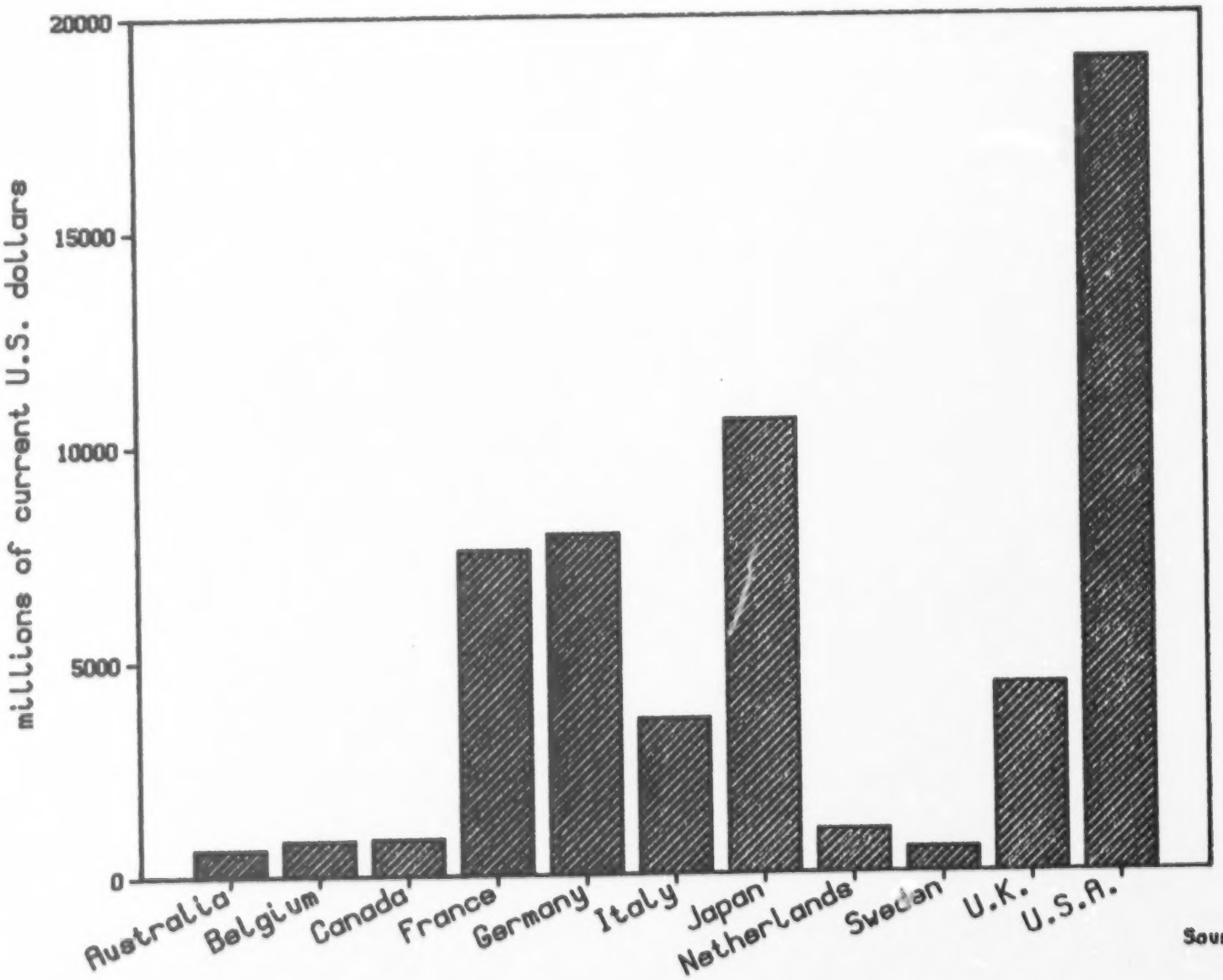
Drugs and medicines

> The manufacture, fabrication and processing of drugs and medicines, including biological products, such as bacterial and virus vaccines, serums and plasmas; medicinal chemicals and botanical products, such as antibiotics, quinine, strychnine, sulfa drugs, opium and derivatives, adrenal, caffeine, codeine derivatives, vitamins; and pharmaceutical preparations for human or veterinary use.(5)

Although drugs and medicines would seem to have little in common with electronic components, comparison of Figures 1 and 6 show that the national order of production is the same: U.S.A., Japan, Germany, France, U.K., Italy, Netherlands. The value of Canadian output of drugs and medicines was about 40% its production of electronic components in 1980. From Figure 7, it appears that, in the decade of the 1970s, Canadian production increases lagged behind those of the other OECD countries in this case as for electronic components.

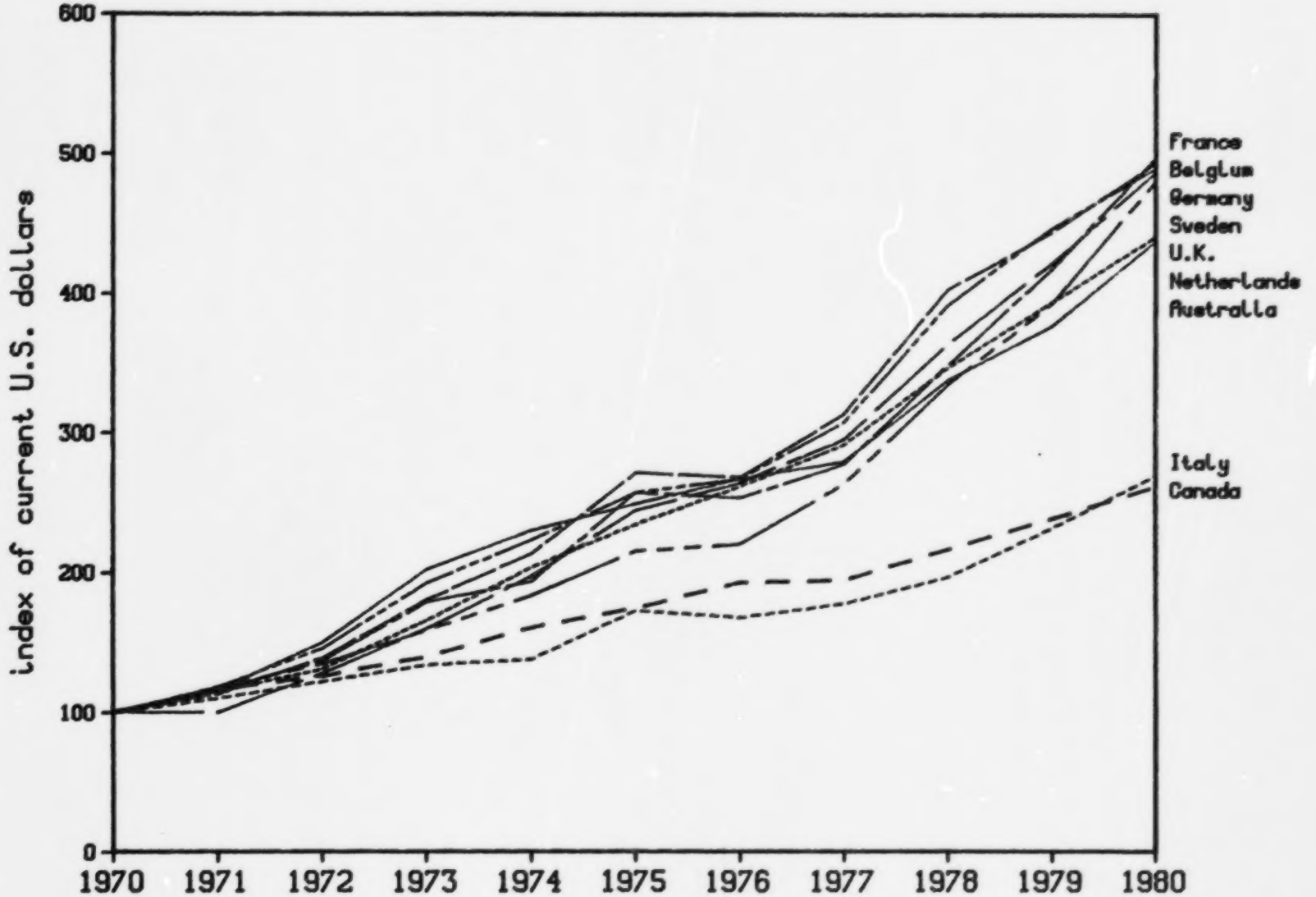
Both export share of production and import penetration were low (Figures 8 and 9). Export share was much lower than the import indicator. This low level of exports is reflected in the apparent comparative advantage displayed in Figure 10: in 1982, only one other country had a lower ratio.

Fig. 6. Production of Drugs and Medicines, 1980



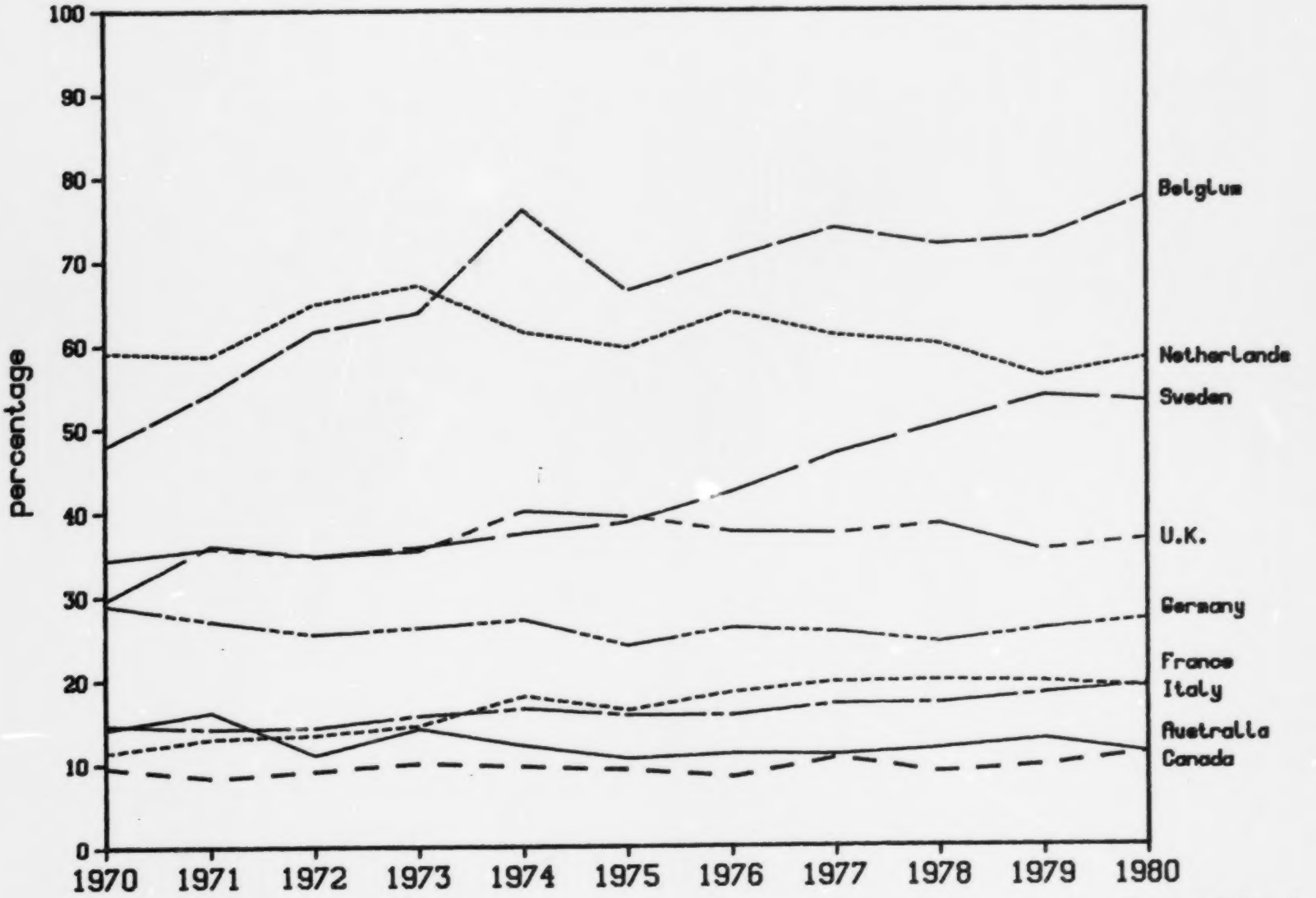
Source: Table 5.

Fig 7. Production of Drugs and Medicines, 1970-1980



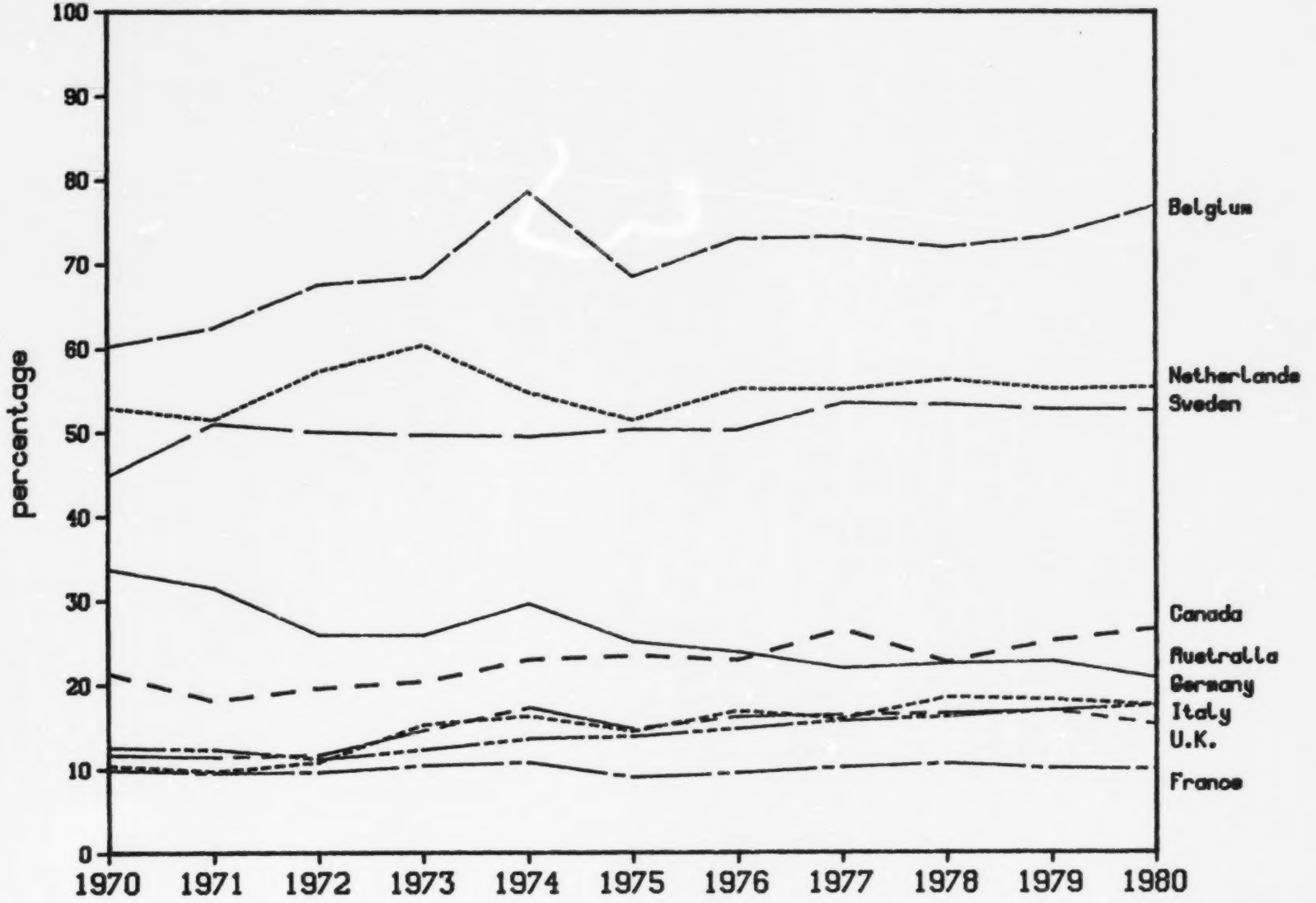
Source: Table 5.

Fig. 8. Export Share of Production of Drugs and Medicines, 1970-1980



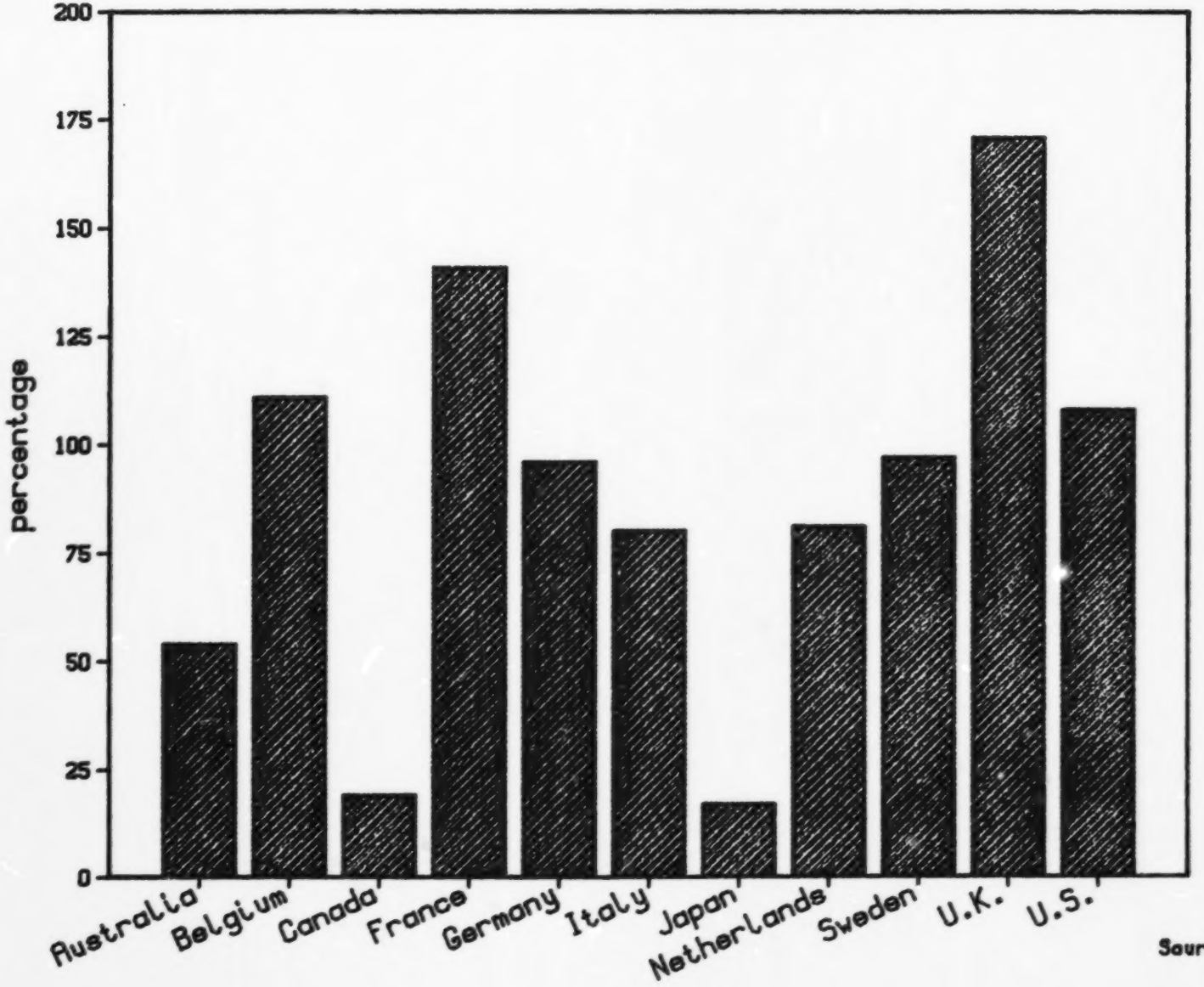
Source: Table 6.

Fig. 9. Import Penetration of Drugs and Medicines, 1970-1980



Source: Table 7.

Fig. 10. Comparative Advantage for Drugs and Medicines, 1982



Source: Table 8.

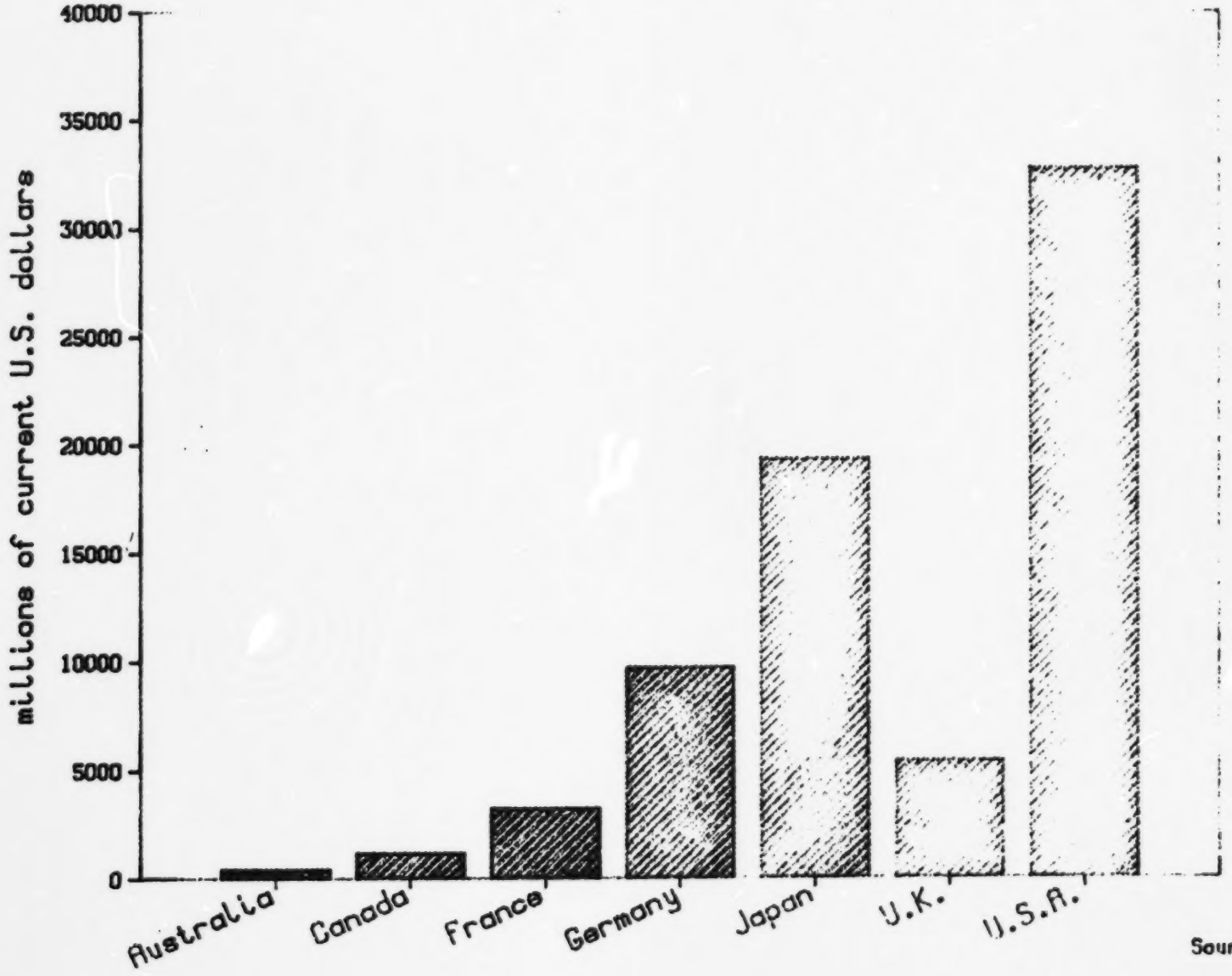
Scientific instruments

Manufacture of professional and scientific, and measuring and controlling equipment not elsewhere classified, of photographic and optical goods, and of watches and clocks.

Production data are not available for Belgium, Italy, the Netherlands or Sweden, so they are not included in Figures 11-14. In Canada, the value of the production of the scientific instruments industry was about half that of the electronic components industry in 1980. Canada is a minor producer in a field dominated by the U.S.A., Japan and Germany. As for the products of the electronic components and drugs and medicines industries, Figure 12 indicates that Canadian production appears to have increased relatively less than output in other countries from 1970 to 1980.

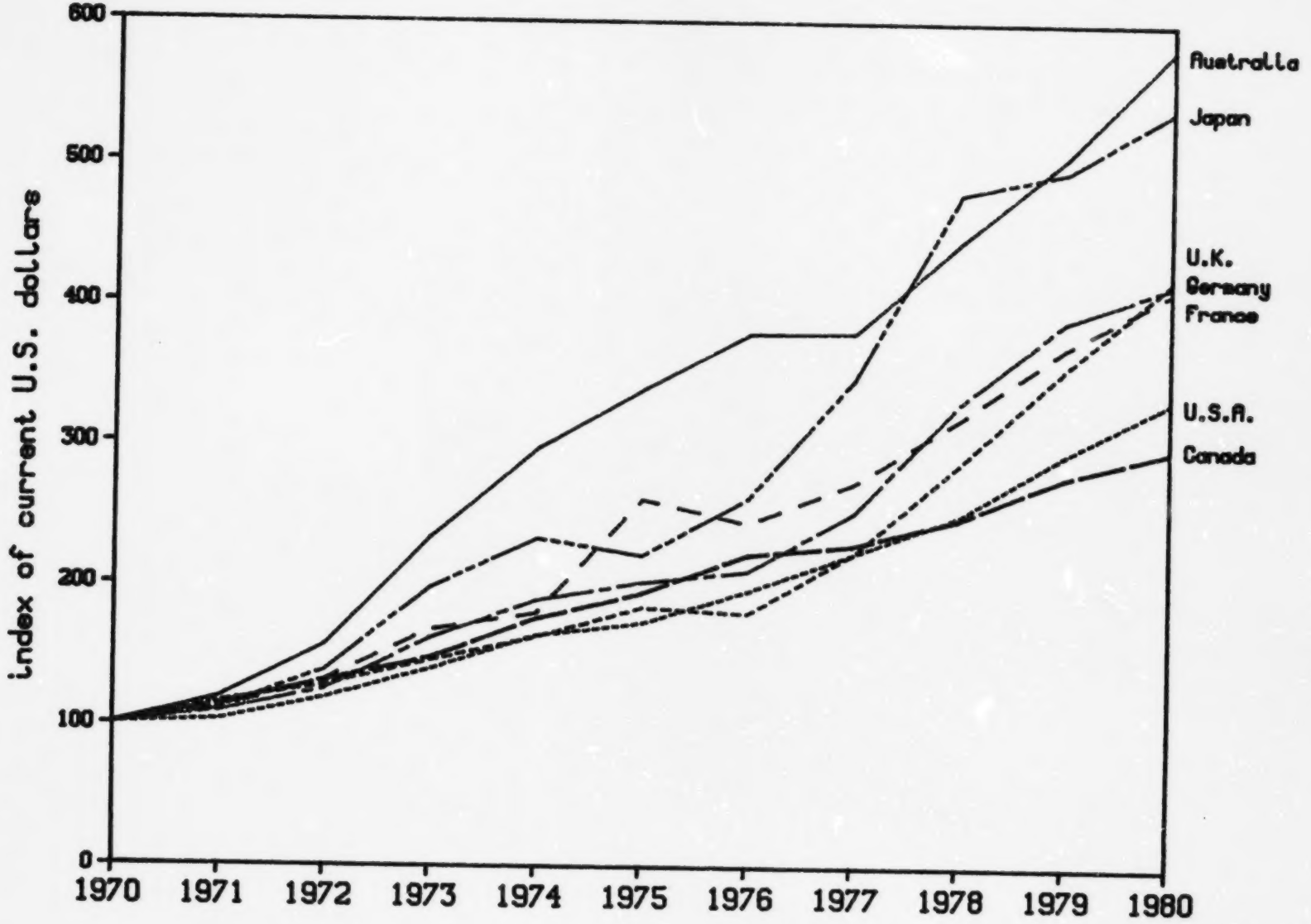
With their large domestic markets, both the U.S.A. and Japan had relatively low export shares and import penetration ratios. The general trend, for most countries, was an increase in both relative exports and imports (Figures 13 and 14). The comparative advantage indicator is lower for Canada than most of the other countries, reflecting, in part, our large exports of natural resource-related products. The actual value of the indicator lies between that for electronic components and that for drugs and medicines.

Fig. 11. Production of Scientific Instruments, 1980



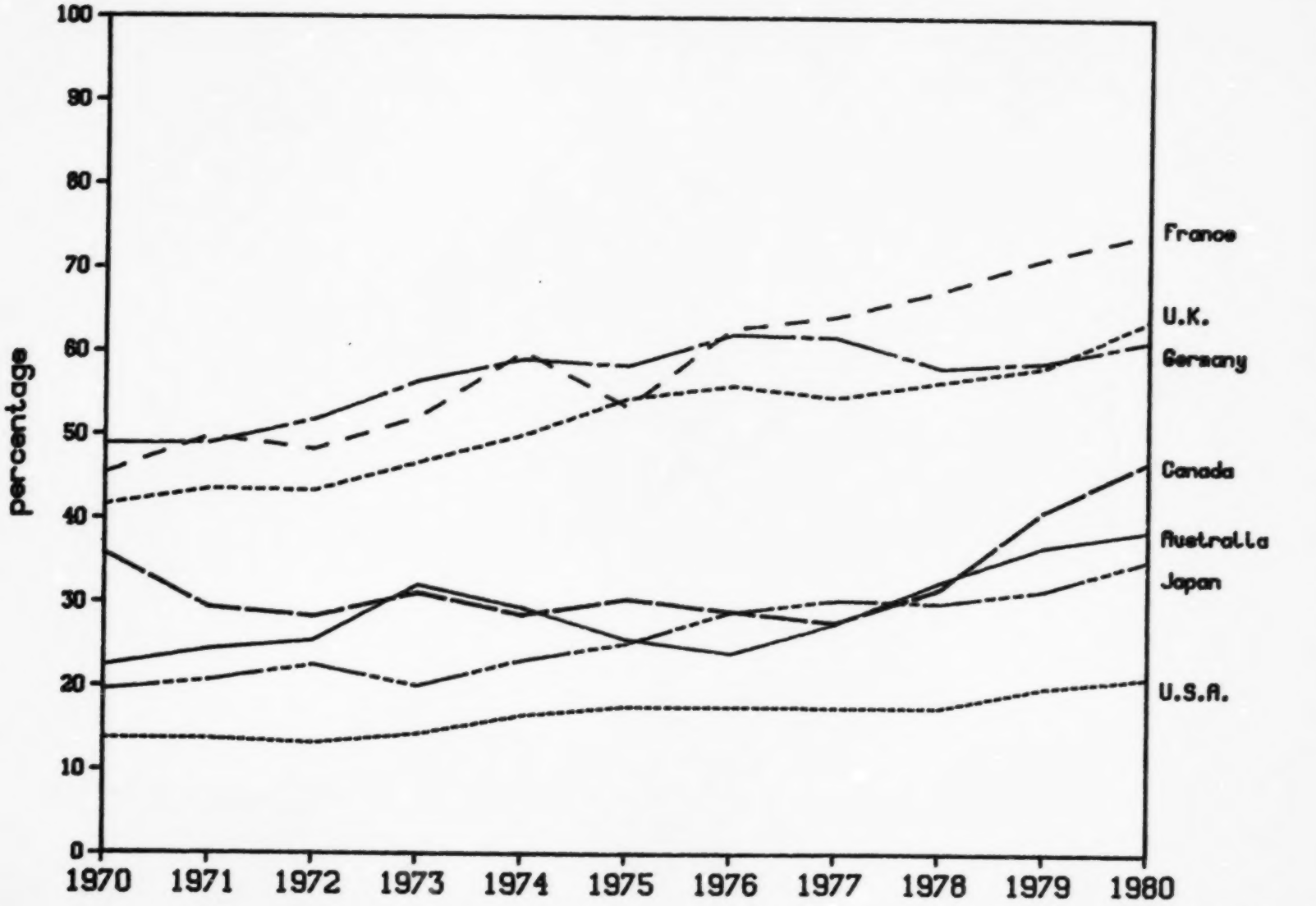
Source: Table 9.

Fig. 12. Production of Scientific Instruments, 1970-1980



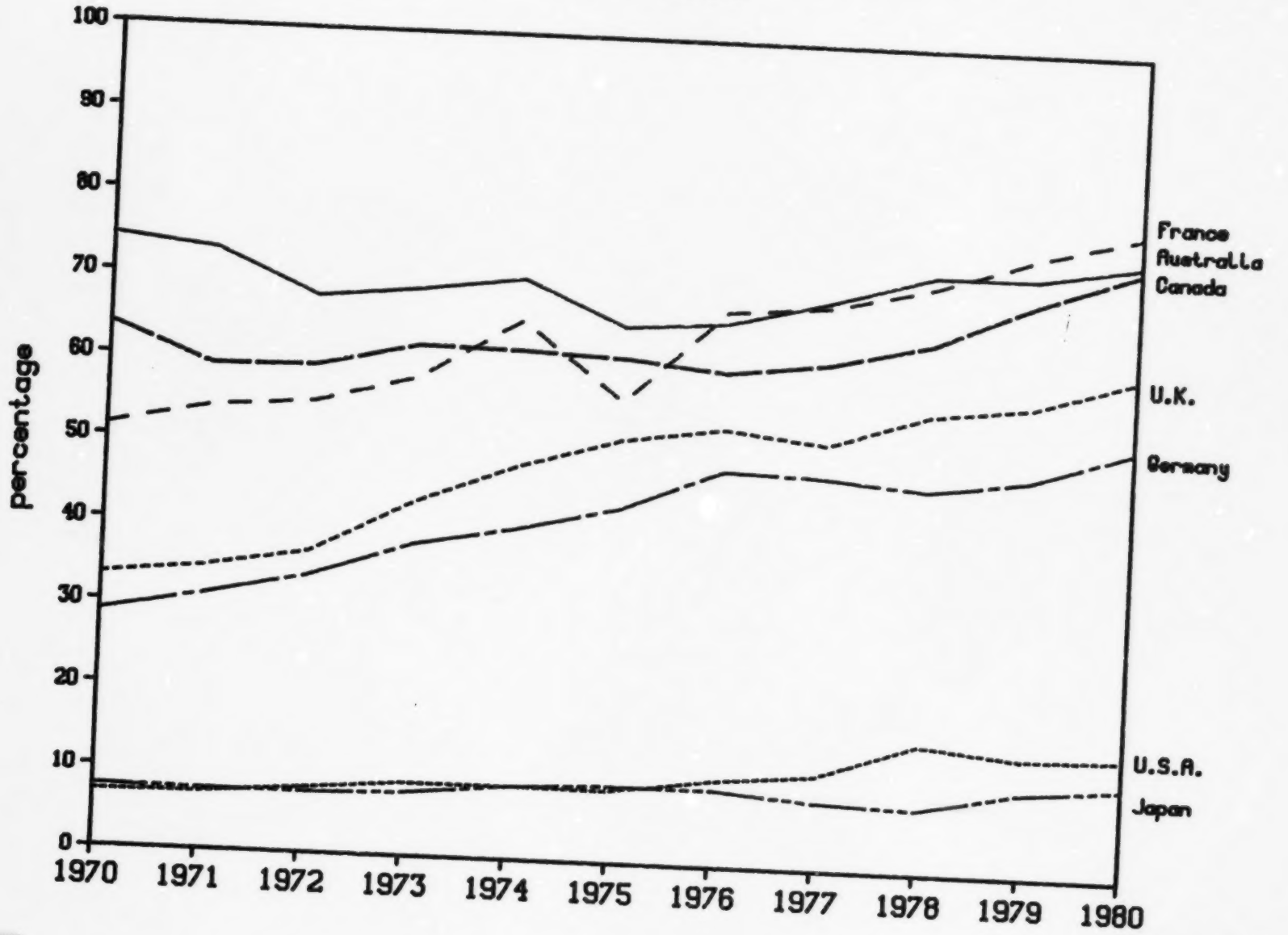
Source: Table 8.

Fig. 13. Export Share of Production of Scientific Instruments, 1970-1980



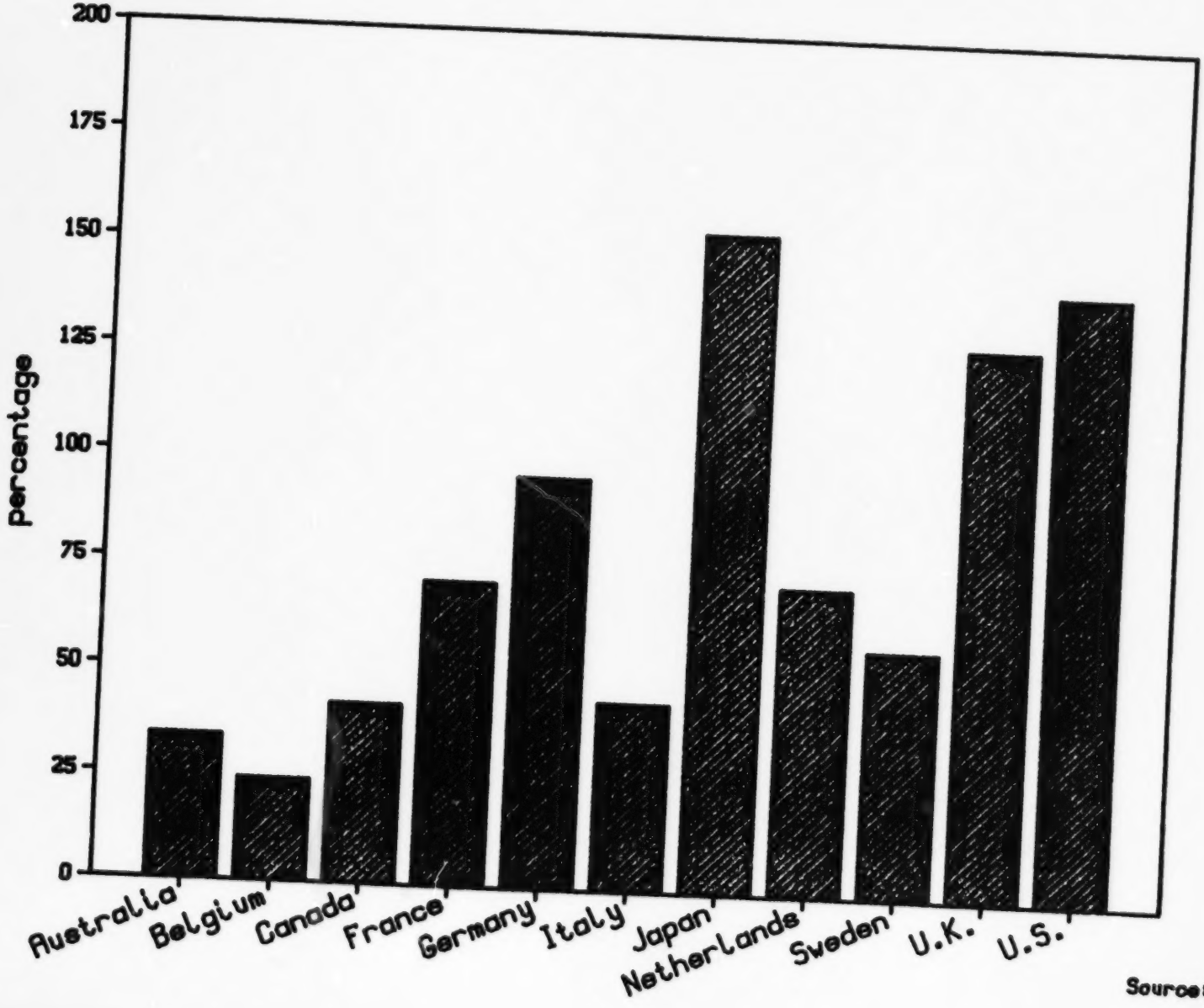
Source: Table 10.

Fig. 14. Import Penetration of Scientific Instruments, 1970-1980



Source: Table 11.

Fig. 15. Comparative Advantage Indicator for Scientific Instruments, 1982



Source: Table 12.

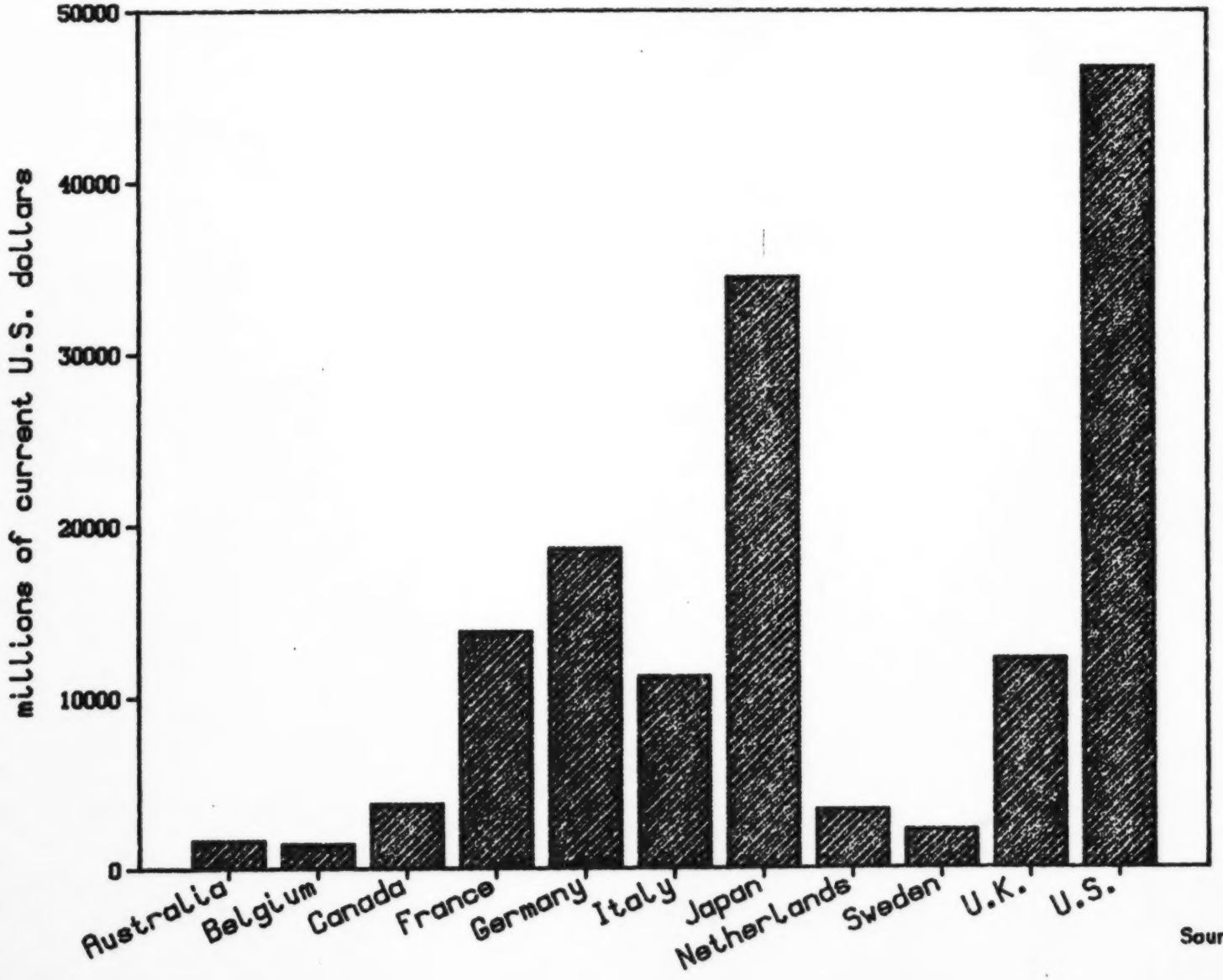
Electrical machinery

> The manufacture of electrical industrial machinery and apparatus, including electric motors, generators, transformers, switch gear, rectifiers, other electrical transmission and distribution equipment, electrical industrial control devices, and electrical welding apparatus; the manufacture of electrical appliances and housewares such as electric space heaters, blankets, hot plates, broilers, toasters and food mixers, vacuum cleaners and floor waxers and polishers, hair driers, shavers, and hot water heaters; manufacture of electrical apparatus and supplies not elsewhere classified, such as insulated wire and cables, batteries, electric lamps, conduits and fittings.

Although Canadian production of electrical machinery was larger than for any other of the selected commodity groups (representing almost 50% of the total 1980 output of the four industries), it still ranked 7th among the 11 chosen countries. Figure 16 shows the now familiar order of the U.S.A., Japan, Germany, France, U.K. and Italy as producers. Figure 17 also shows a familiar pattern: Canadian output increased less in the 1970s than that of other countries.

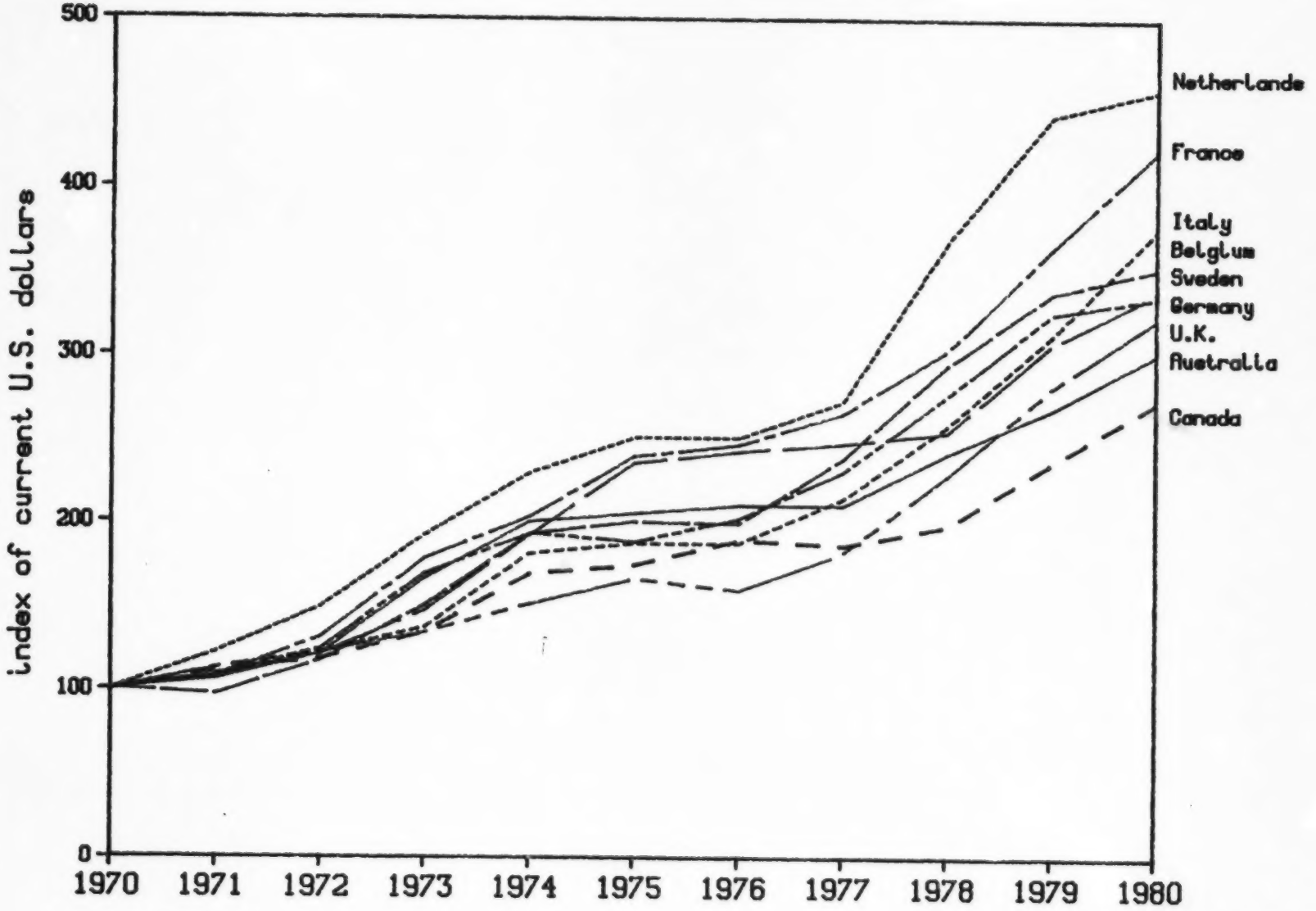
As in the case of drugs and medicines, export share and import penetration were relatively low and stable. This low export share is reflected in the comparative advantage indicator of Figure 20: lower than for all other countries except Australia.

Fig. 16. Production of Electrical Machinery, 1980



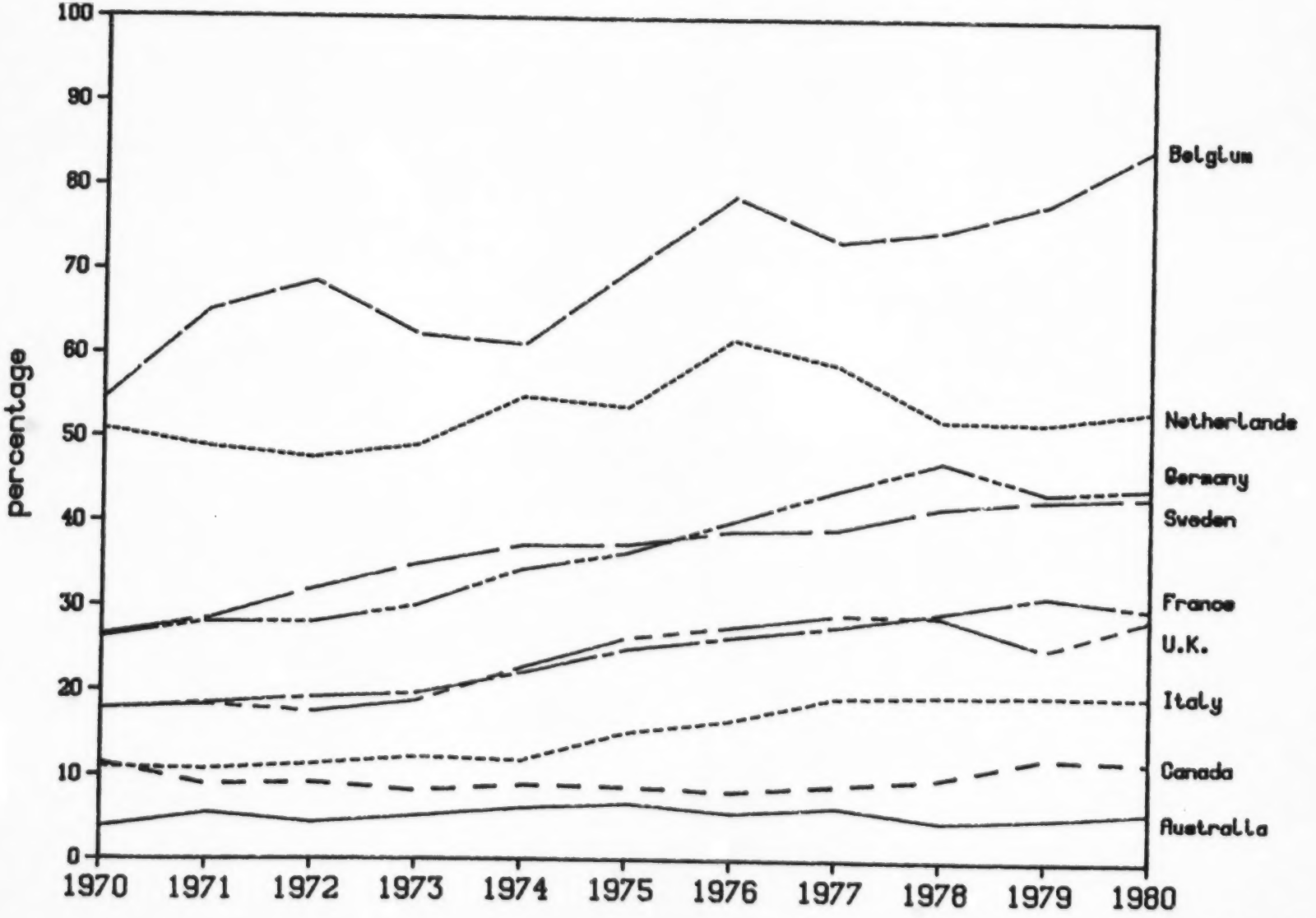
Source: Table 13.

Fig. 17. Production of Electrical Machinery, 1970-1980



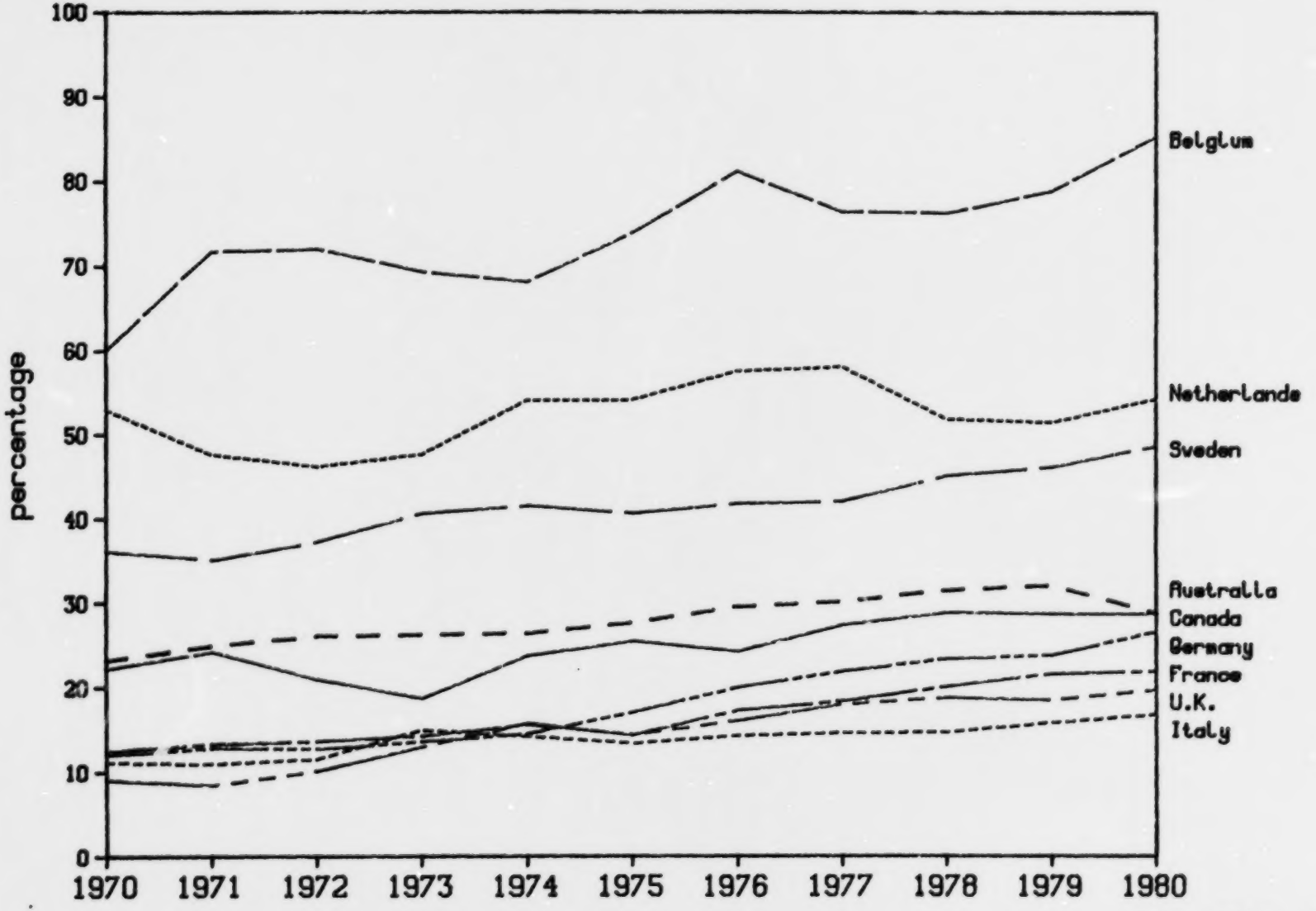
Source: Table 13.

Fig. 18. Export Share of Production of Electrical Machinery, 1970-1980



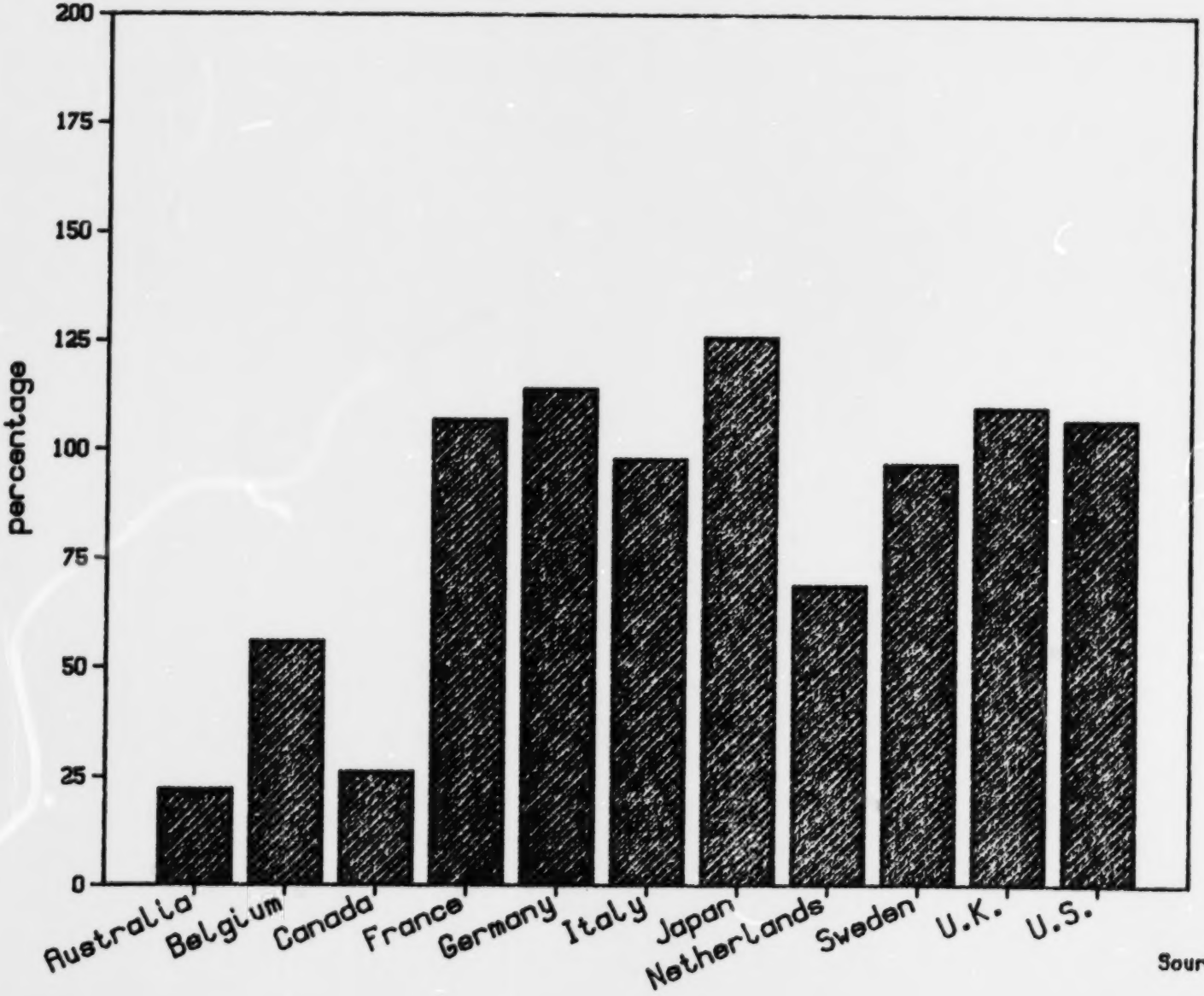
Source: Table 14.

Fig. 19. Import Penetration of Electrical Machinery, 1970-1980



Source: Table 15.

Fig. 20. Comparative Advantage Indicator for Electrical Machinery, 1982



Source: Table 16.

The situation indicated by the preceding pages appears to be a gloomy one. There is fairly general agreement that strong "high-tech" industries are desirable, both because these are the growth industries of the future and because of their influence on the cost and quality of output from the less technologically advanced manufacturing and natural resource industries. The products of these manufacturing industries can also lead to the creation or development of new service industries. However, the picture must be qualified. Because of strength in other areas, these industries are not as vital for Canada as in the case of countries such as Japan. For example, in 1980, production of the four chosen industries represented only 5% of total manufacturing production (although they accounted for 7% in 1970). Furthermore, each of these industries produces a wide range of products, with different market potentials, production levels and relative costs.

The choice of countries used in the OECD document also influences the overall impression of weakness. Most of the countries selected have larger populations and industrial bases than Canada; a different set of countries might well result in a different picture. And, as noted in footnote 5, the potentially most unfavourable indicator, the relative trend in production since 1970, may be flawed by the choice of the unit of measurement (current U.S. dollars). Finally, we repeat the caution made earlier: the statistics end in 1980, for production, and 1982, for trade. They are, therefore, out-of-date and may not reflect the current situation.

Footnotes

(1) "Trade in High Technology Products: An Initial Contribution to the Statistical Analysis of Trade Patterns in High Technology Products", DSTI/SPR/84.66 (1st revision), OECD, Paris, 30 January 1985, p. 5.

(2) Extracted from "Competitive Position Indicators of Manufacturing Industries" (Science, Technology and Industry Indicators: Volume E), DSTI/SPR/85.14, OECD, Paris, 25 March 1985.

(3) "Market Penetration Project: The Data Base", Vassilis Panoutsopoulos, Comparative Analysis and Data Division, Economic Analysis and Projections Department, the World Bank, June 1984 (as quoted in "Competitive Position Indicators of Manufacturing Industries", OECD, op.cit.

(4) International Standard Industrial Classification of all Economic Activities, Statistical Papers, Series M, No. 4, Rev. 2, United Nations, 1968.

(5) Because of the use of current U.S. dollars as the unit of measure, apparent results are affected by exchange rate behaviour. However, fundamental patterns would probably not be affected.

TECHNICAL NOTE

The formula used to identify the R&D-intensive industries within the OECD countries is the following:

$$T_j = \sum_i^{''} \left(\frac{Y_{ij}}{\Sigma Y_{ij}} \right) \left(\frac{RD_{ij}}{Y_{ij}} \right)$$

where i = country
j = industry
RD_{ij} = R&D expenditure of country i in industry j
Y_{ij} = output of country i in industry j
T_j = OECD overall intensity of R&D for industry j

The formula used to calculate import penetration is:

$$P_{ij} = 100 \left(\frac{M_{ij}}{Y_{ij} - X_{ij} + M_{ij}} \right)$$

where i = country
j = industry
X_{ij} = exports of country i from industry j
M_{ij} = imports of country i from industry j
Y_{ij} = output of country i in industry j
P_{ij} = import penetration of country i in industry j

The formula used to calculate comparative advantage is:

$$CA_{ij} = 100\left(\frac{X_{ij}/X_{im}}{\Sigma X_{ij}/\Sigma X_{im}}\right)$$

where i = country

j = industry

X_{ij} = exports of country i from industry j

X_{im} = manufacturing exports of country i

CA_{ij} = comparative advantage of country i in industry j

STATISTICAL TABLES

TABLE 1. Production of Electronic Components

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
	millions of current U.S. dollars										
Australia	298	327	397	560	707	773	781	715	754	811	989
Belgium	419	453	599	761	939	1048	1175	1341	1454	1603	1722
Canada	992	910	1071	1242	1592	1653	1710	1571	1564	1838	2119
France	2071	2356	3013	4078	4545	5853	6118	6781	8328	10171	11695
Germany	3501	3733	5244	6727	7656	7721	8362	9581	11394	12422	12960
Italy	1368	1593	1867	2198	2560	2812	3065	3647	3942	5086	6670
Japan	10235	10773	13971	16773	18544	17470	24096	28035	35745	37144	41509
Netherlands	1077	1304	1570	1948	2390	2666	2834	3434	4147	4688	4864
Sweden	485	550	731	896	1139	1465	1408	1518	1824	2294	2656
U.K.	3974	4396	4596	4677	4933	5075	4944	5482	6731	8453	10822
U.S.A.	22865	22952	25564	29459	30490	30451	35250	38471	40779	45123	45084

Source: Science, Technology and Industry Indicators, Volume E: Competitive Position Indicators of Manufacturing Industries, DSTI/SPR/85.4, OECD, Paris, 25 March 1985.

TABLE 2. Export Share of Production for Electronic Components

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
	percentage												
Australia	3.8	3.5	3.9	3.6	4.2	4.8	3.8	4.3	4.2	4.7	6.0		
Belgium	68.4	69.1	75.5	83.9	79.3	84.1	84.6	81.4	89.4	88.3	94.3		
Canada	27.0	25.8	22.5	26.5	23.3	24.2	26.7	27.4	29.0	34.5	38.4		
France	18.2	18.4	17.7	19.7	21.9	20.6	22.6	23.3	22.8	23.5	22.7		
Germany	33.5	34.3	30.7	35.0	37.3	39.9	44.0	42.1	44.2	46.4	49.8		
Italy	22.5	23.0	25.4	27.6	27.7	28.6	28.3	26.5	28.2	24.7	21.0		
Japan	19.7	22.5	22.5	21.2	24.3	26.9	32.2	30.5	29.6	31.2	36.9		
Netherlands	54.9	52.9	51.2	49.3	55.1	53.8	62.0	59.0	53.5	53.0	54.8		
Sweden	53.1	50.9	52.3	56.9	55.4	57.5	62.9	57.8	56.5	53.2	49.7		
U.K.	13.6	14.2	15.1	18.0	22.3	26.6	31.6	34.3	31.3	26.5	26.1		
U.S.A.	6.4	6.2	7.0	8.5	11.1	11.3	12.4	12.2	12.0	12.9	14.4		

Source: Science, Technology and Industry Indicators, Volume E: Competitive Position Indicators of Manufacturing Industries, DSTI/SPR/85.4, OECD, Paris, 25 March 1985.

TABLE 3. Import Penetration of Electronic Components

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
	percentage												
Australia	29.5	27.8	25.2	25.6	36.4	44.3	45.1	47.1	42.8	44.8	44.2		
Belgium	62.7	67.4	71.6	81.6	76.3	81.9	81.7	78.4	87.7	87.0	93.6		
Canada	36.7	40.8	44.2	47.3	45.3	41.3	48.0	51.8	54.0	58.3	59.6		
France	18.3	18.4	18.6	21.0	23.7	20.7	24.5	24.7	24.8	24.7	26.1		
Germany	22.6	22.4	23.6	24.9	26.3	29.3	33.3	34.1	37.4	40.2	45.6		
Italy	21.7	18.5	21.0	28.0	28.8	27.5	31.2	29.7	35.2	34.4	32.4		
Japan	2.4	2.3	2.0	2.6	3.8	3.8	4.1	3.7	3.7	4.8	5.1		
Netherlands	53.2	48.6	47.4	47.6	52.0	54.0	57.4	54.7	50.7	49.4	52.5		
Sweden	51.2	42.9	44.4	48.5	49.8	48.8	56.3	51.7	47.4	44.0	42.8		
U.K.	10.8	11.3	16.7	25.7	25.6	24.4	26.1	31.0	30.6	31.6	26.8		
U.S.A.	7.8	9.0	10.7	12.2	13.9	12.7	16.9	17.2	20.0	20.1	21.7		

Source: Science, Technology and Industry Indicators, Volume E: Competitive Position Indicators of Manufacturing Industries, DSTI/SPR/85.4, OECD, Paris, 25 March 1985.

TABLE 4. Comparative Advantage Indicator for Electronic Components

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
						percentage							
Australia			9.3	7.6	12.0	14.9	9.0	9.3	8.7	8.6	11.3	10.7	8.7
Belgium			68.4	70.7	71.1	81.5	69.4	69.2	70.4	66.6	64.3	55.9	44.8
Canada			36.0	41.1	45.8	45.0	35.5	31.0	29.9	36.7	41.0	50.9	49.5
France			52.9	58.1	61.8	62.3	57.0	58.2	59.2	61.8	59.3	53.4	54.1
Germany			83.0	83.7	83.3	87.4	78.6	77.1	81.7	82.4	80.5	70.4	67.2
Italy			62.6	66.2	61.6	59.3	51.2	48.6	45.4	42.4	42.4	36.3	39.1
Japan			257.2	254.2	208.5	209.4	246.4	232.8	242.9	268.4	273.0	269.7	254.3
Netherlands			125.1	109.0	114.8	118.6	108.3	119.7	116.3	108.5	99.1	76.0	67.5
Sweden			106.2	102.3	105.5	125.0	105.9	103.5	108.1	108.3	101.1	91.0	92.6
U.K.			70.1	68.6	76.3	80.6	76.2	78.3	72.8	72.5	66.6	69.4	72.1
U.S.A.			103.8	109.5	114.2	103.2	102.9	108.6	97.6	99.6	94.0	88.9	114.6

Source: Science, Technologie and Industry Indicators, Volume 1: Competitive Position Indicators of Manufacturing Industries, DSTI/SPR/85.4, OECD, Paris, 25 March 1985.

TABLE 5. Production of Drugs and Medicines

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
	millions of current U.S. dollars												
Australia	146	170	219	297	337	365	392	408	494	550	640		
Belgium	171	193	237	310	366	465	460	536	689	759	844		
Canada	331	384	418	465	534	579	639	644	719	792	866		
France	1521	1764	2088	2728	2953	3928	3863	4236	5304	6362	7580		
Germany	1619	1907	2361	3123	3623	4185	4335	4978	6353	7232	7938		
Italy	1340	1474	1640	1800	1854	2314	2249	2388	2645	3109	3622		
Japan	2539	2889	3326	4473	5123	5497	6028	7410	10022	10320	10587		
Netherlands	233	267	306	368	475	548	610	681	808	919	1028		
Sweden	118	118	151	189	233	289	313	349	430	498	575		
U.K.	914	1083	1233	1453	1679	1973	2023	2412	3058	3590	4396		
U.S.A.	6362	6787	7585	8386	9615	10525	11866	13360	15099	17097	18969		

Source: Science, Technology and Industry Indicators, Volume E: Competitive Position Indicators of Manufacturing Industries, DSTI/SPR/85.4, OECD, Paris, 25 March 1985.

TABLE 6. Export Share of Production for Drugs and Medicines

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
	percentage												
Australia	14.2	16.2	11.0	14.1	12.1	10.5	11.1	10.9	11.7	12.7	11.1		
Belgium	47.9	54.2	61.6	63.8	76.1	66.4	70.3	73.9	71.9	72.7	77.6		
Canada	9.6	8.3	9.1	10.0	9.6	9.2	8.3	10.5	8.8	9.6	11.1		
France	14.7	14.2	14.3	15.7	16.5	15.7	15.7	17.0	17.1	18.2	19.2		
Germany	29.0	27.0	25.4	26.2	27.1	24.0	26.1	25.6	24.4	25.9	27.1		
Italy	11.4	13.0	13.4	14.5	18.0	16.3	18.4	19.6	19.8	19.6	18.9		
Japan	2.3	2.7	2.4	2.1	2.5	2.1	2.2	2.3	2.1	2.5	2.6		
Netherlands	59.1	58.6	64.9	67.1	61.5	59.6	63.9	61.1	60.0	56.1	58.3		
Sweden	29.6	36.0	34.8	35.8	37.4	38.7	42.3	46.9	50.3	53.7	53.1		
U.K.	34.4	35.7	34.7	35.4	40.0	39.4	37.6	37.4	38.5	35.3	36.7		
U.S.A.	6.4	5.6	6.0	7.2	7.9	7.8	7.9	7.6	9.4	9.3	10.2		

Source: Science, Technology and Industry Indicators, Volume E: Competitive Position Indicators of Manufacturing Industries, DSTI/SPR/85.4, OECD, Paris, 25 March 1985.

TABLE 7. Import Penetration of Drugs and Medicines

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
	percentage												
Australia	33.7	31.5	25.9	25.9	29.7	25.1	23.9	21.9	22.5	22.7	20.8		
Belgium	60.2	62.4	67.5	68.4	78.6	68.4	72.9	73.2	71.9	73.3	76.9		
Canada	21.3	18.1	19.6	20.4	23.0	23.5	22.9	26.5	22.6	25.2	26.6		
France	9.9	9.5	9.6	10.4	10.8	9.0	9.5	10.2	10.6	10.0	9.9		
Germany	12.6	12.3	11.2	12.3	13.6	13.9	14.8	15.7	16.2	16.9	17.5		
Italy	10.4	9.7	10.8	15.3	16.3	14.5	16.9	15.9	15.5	18.2	17.5		
Japan	7.5	7.4	7.2	7.4	8.1	7.3	8.3	7.6	7.5	8.2	9.2		
Netherlands	52.9	51.5	57.2	60.3	54.7	51.4	55.1	55.0	56.2	55.1	55.3		
Sweden	44.9	51.0	50.0	49.7	49.5	50.3	50.2	53.4	53.2	52.7	52.6		
U.K.	11.7	11.4	11.7	14.6	17.3	14.8	16.2	16.4	16.6	16.9	15.2		
U.S.A.	1.4	1.8	2.0	2.1	2.3	2.4	2.4	2.5	4.7	4.3	4.5		

Source: Science, Technology and Industry Indicators, Volume E: Competitive Position Indicators of Manufacturing Industries, DSTI/SPR/85.4, OECD, Paris, 25 March 1985.

TABLE 8. Comparative Advantage Indicator for Drugs and Medicines

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
	percentage												
Australia			57.9	62.7	66.9	61.6	63.3	63.1	68.5	66.6	57.8	59.8	53.6
Belgium			89.7	89.0	107.7	114.0	108.8	116.5	115.7	110.2	110.7	124.0	110.7
Canada			22.8	23.7	23.6	24.0	19.8	22.6	18.0	18.6	20.7	24.4	19.1
France			118.7	125.9	122.2	127.4	120.8	123.1	121.7	127.2	138.9	142.2	140.9
Germany			123.7	115.1	116.4	113.6	116.6	113.0	108.7	113.9	114.5	115.9	95.6
Italy			114.4	115.2	116.8	111.2	117.9	109.3	92.3	87.5	88.5	92.0	79.8
Japan			25.7	24.6	24.2	20.7	20.7	21.5	21.2	24.9	21.3	20.3	17.2
Netherlands			123.3	120.2	103.2	107.9	115.7	114.0	109.5	95.6	95.1	93.6	81.1
Sweden			58.5	55.1	58.9	66.2	76.3	89.5	97.8	100.7	99.9	102.8	97.0
U.K.			171.9	170.8	188.9	185.6	178.7	174.5	175.8	162.0	162.2	189.5	170.9
U.S.A.			105.2	107.0	104.3	98.0	106.4	109.0	122.2	116.4	112.2	113.0	107.6

Source: Science, Technology and Industry Indicators, Volume E: Competitive Position Indicators of Manufacturing Industries, DSTI/SPR/85.4, OECD, Paris, 25 March 1985.

TABLE 9. Production of Scientific Instruments

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
	millions of current U.S. dollars												
Australia	67	80	105	157	199	227	254	255	298	339	390		
Belgium	..	..	..	..	..	..	..	..	..	..	..		
Canada	387	442	507	572	682	750	859	887	960	1077	1151		
France	783	860	1036	1316	1412	2044	1903	2136	2499	2901	3210		
Germany	2041	2547	2936	3789	4422	4736	4926	5894	7731	9115	9722		
Italy	455	479	542	567	676	730	683	..	..	..	..		
Japan	3593	3999	4982	7116	8372	7953	9434	12471	17196	17796	19352		
Netherlands	..	..	..	..	..	..	..	..	..	..	..		
Sweden	123	137	138	174	..	..	..	..	..	..	..		
U.K.	1293	1504	1658	1896	2111	2382	2334	2887	3710	4589	5411		
U.S.A.	9867	10173	11784	13792	16218	17109	19358	21969	24633	29030	32785		

Source: Science, Technology and Industry Indicators, Volume E: Competitive Position Indicators of Manufacturing Industries, DSTI/SPR/85.4, OECD, Paris, 25 March 1985.

TABLE 10. Export Share of Production for Scientific Instruments

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
	percentage												
Australia	22.4	24.4	25.4	32.1	29.4	25.6	24.0	27.6	32.6	36.8	38.7		
Belgium	..	..	..	..	..	..	..	..	..	..	..		
Canada	35.8	29.3	28.3	31.1	28.5	30.4	29.0	27.7	31.7	41.1	47.0		
France	45.4	45.8	48.2	52.1	60.0	53.4	62.8	64.3	67.4	71.3	74.3		
Germany	48.9	49.0	51.8	56.4	59.1	58.3	62.1	61.8	58.2	58.9	61.4		
Italy	43.3	44.6	48.4	56.4	56.7	60.3	65.2	..	..	..	..		
Japan	19.5	20.7	22.5	20.0	23.1	25.1	28.9	30.4	30.0	31.6	35.2		
Netherlands	..	..	..	..	..	..	..	..	..	..	..		
Sweden	68.2	71.6	81.6	86.5	..	..	..	..	..	..	..		
U.K.	41.6	43.5	43.3	46.7	50.0	54.4	56.0	54.6	56.5	58.3	63.9		
U.S.A.	13.7	13.7	13.2	14.3	16.5	17.6	17.6	17.5	17.5	19.9	21.1		

Source: Science, Technology and Industry Indicators, Volume E: Competitive Position Indicators of Manufacturing Industries, DSTI/SPR/85.4, OECD, Paris, 25 March 1985.

TABLE 11. Import Penetration of Scientific Instruments

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
	percentage												
Australia	74.3	72.5	67.6	68.8	70.5	65.1	66.0	69.1	72.6	72.7	74.7		
Belgium	..	..	..	..	..	..	..	..	..	..	..		
Canada	63.7	58.9	59.2	62.0	61.8	61.3	60.0	61.5	64.3	69.6	73.9		
France	51.3	53.9	54.8	58.1	65.4	56.1	67.4	68.4	71.2	75.2	78.3		
Germany	28.7	31.1	33.7	37.9	40.2	43.1	46.1	47.7	46.6	46.2	52.2		
Italy	52.0	54.7	58.4	68.8	67.7	71.0	78.5	..	..	..	..		
Japan	7.6	7.4	7.4	7.7	8.9	9.4	9.4	8.3	7.9	10.3	11.2		
Netherlands	..	..	..	..	..	..	..	..	..	..	..		
Sweden	82.7	83.3	89.5	92.4	..	..	..	..	..	..	..		
U.K.	33.2	34.5	36.6	43.0	47.8	51.4	53.2	51.7	55.7	57.1	60.8		
U.S.A.	6.9	7.0	7.9	8.9	8.9	8.8	10.5	11.5	15.7	14.4	14.7		

Source: Science, Technology and Industry Indicators, Volume E: Competitive Position Indicators of Manufacturing Industries, DSTI/SPR/85.4, OECD, Paris, 25 March 1985.

TABLE 12. Comparative Advantage Indicator for Scientific Instruments

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
	percentage												
Australia			25.2	29.9	36.6	35.3	31.5	33.6	38.5	38.9	40.4	39.5	34.4
Belgium			18.7	17.9	20.3	26.9	27.7	27.7	30.8	27.7	28.7	26.4	24.5
Canada			33.9	35.8	34.0	38.2	33.3	27.7	29.0	35.4	38.3	37.7	42.2
France			78.2	79.7	81.0	84.0	84.7	79.3	75.9	74.0	74.9	68.7	70.9
Germany			123.7	122.1	117.7	116.8	112.0	109.1	105.5	106.3	104.8	97.5	96.3
Italy			53.8	56.1	51.2	48.3	47.9	48.5	43.2	42.6	46.3	43.5	43.6
Japan			144.4	146.0	137.6	133.0	148.2	162.1	170.7	180.2	171.3	167.8	153.7
Netherlands			96.3	97.0	96.5	107.0	93.3	88.4	91.2	86.7	77.8	69.8	72.5
Sweden			49.4	48.6	46.3	52.3	56.5	57.1	55.5	54.5	59.4	59.1	57.6
U.K.			113.9	115.7	113.0	115.5	109.1	103.0	104.8	111.2	114.6	124.0	128.9
U.S.A.			143.0	138.4	140.1	134.7	137.0	136.7	135.3	137.3	132.1	130.7	142.2

Source: Science, Technology and Industry Indicators, Volume E: Competitive Position Indicators of Manufacturing Industries, DSTI/SPR/85.4, OECD, Paris, 25 March 1985.

TABLE 13. Production of Electrical Machinery

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
	millions of current U.S. dollars												
Australia	546	579	659	904	1090	1117	1146	1144	1316	1464	1642		
Belgium	410	396	481	617	792	821	817	977	1205	1380	1445		
Canada	1392	1539	1649	1872	2350	2417	2629	2579	2750	3292	3784		
France	3278	3555	4286	5820	6655	7846	8050	8700	9939	11940	13816		
Germany	5568	5998	6899	9393	10724	10444	11241	12816	15359	18102	18646		
Italy	2983	3209	3650	4088	5409	5588	5570	6574	7709	9721	11197		
Japan	8733	9316	12133	17754	19065	16396	19363	23701	31372	32325	34452		
Netherlands	748	915	1117	1440	1715	1867	1967	2038	2754	3317	3428		
Sweden	659	720	797	969	1267	1547	1593	1625	1672	2023	2225		
U.K.	3792	4282	4627	5071	5734	6310	6018	6916	8663	10662	12209		
U.S.A.	20972	21591	24121	28201	31720	29898	33947	37063	40300	44144	46726		

Source: Science, Technology and Industry Indicators, Volume E: Competitive Position Indicators of Manufacturing Industries, DSTI/SPR/85.4, OECD, Paris, 25 March 1985.

TABLE 14. Export Share of Production for Electrical Machinery

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
	percentage												
Australia	3.9	3.4	4.3	5.1	6.1	6.7	5.6	6.3	4.7	5.2	5.9		
Belgium	54.5	65.1	68.6	62.3	61.2	70.1	78.9	73.6	74.9	76.2	84.9		
Canada	11.4	8.8	9.0	9.1	8.8	8.6	8.1	8.9	9.8	12.3	11.8		
France	17.8	18.4	19.1	19.7	22.2	25.0	26.5	27.8	29.5	31.5	30.0		
Germany	26.2	28.0	28.1	30.1	34.5	36.5	40.3	44.0	47.4	43.8	44.5		
Italy	10.9	10.6	11.2	12.1	11.7	15.1	16.6	19.3	19.6	19.7	19.5		
Japan	8.0	8.5	8.6	7.4	9.4	11.0	12.8	14.5	14.7	15.1	18.1		
Netherlands	50.9	48.8	47.6	49.2	55.0	53.8	61.9	58.9	52.3	52.1	53.6		
Sweden	26.5	28.4	32.0	35.0	37.3	37.5	39.1	39.4	42.0	43.0	43.4		
U.K.	17.8	18.2	17.4	18.8	22.8	26.4	27.7	29.2	29.0	25.2	28.8		
U.S.A.	5.3	5.6	5.9	6.6	8.4	10.1	10.8	11.1	11.1	11.8	13.0		

Source: Science, Technology and Industry Indicators, Volume E: Competitive Position Indicators of Manufacturing Industries, DSTI/SPR/85.4, OECD, Paris, 25 March 1985.

TABLE 15. Import Penetration of Electrical Machinery

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
	percentage												
Australia	22.2	24.2	20.9	18.7	23.8	25.5	24.3	27.4	28.9	28.7	30.6		
Belgium	60.0	71.7	72.0	69.3	68.1	73.9	81.2	76.4	76.2	78.8	85.3		
Canada	23.2	24.9	26.1	26.3	26.5	27.7	29.6	30.2	31.5	32.1	28.9		
France	12.5	13.3	13.6	14.3	15.6	14.4	17.3	18.4	20.1	21.6	21.9		
Germany	12.0	12.8	12.7	13.6	14.5	17.1	20.0	21.5	23.4	25.8	26.6		
Italy	11.1	10.9	11.5	15.0	14.2	13.4	14.3	14.6	14.7	15.8	16.8		
Japan	2.2	1.6	1.4	1.6	1.9	2.2	2.6	2.1	2.0	2.5	2.9		
Netherlands	52.9	47.6	46.2	47.7	54.1	54.1	57.5	56.0	51.8	51.4	54.2		
Sweden	36.1	35.1	37.3	40.7	41.6	40.7	41.8	42.1	45.1	46.1	45.6		
U.K.	9.0	8.4	10.1	13.0	15.8	14.4	16.1	18.0	18.8	18.5	19.7		
U.S.A.	3.4	3.3	3.9	4.5	4.7	4.5	5.3	6.2	7.3	8.2	9.0		

Source: Science, Technology and Industry Indicators, Volume E: Competitive Position Indicators of Manufacturing Industries, DSTI/SPR/85.4, OECD, Paris, 25 March 1985.

TABLE 16. Comparative Advantage Indicator for Electrical Machinery

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
	percentage												
Australia			22.2	22.5	32.9	35.3	25.6	26.5	19.4	19.9	22.0	24.6	22.2
Belgium			66.7	56.4	56.3	62.5	59.0	54.9	56.2	58.3	58.3	56.8	55.8
Canada			29.1	25.3	28.6	27.4	21.8	19.8	20.3	26.9	26.9	26.7	25.6
France			106.7	109.6	111.6	118.8	115.5	107.2	105.1	111.8	111.0	105.6	106.6
Germany			131.3	132.9	131.5	127.0	127.2	129.9	135.9	130.6	124.2	112.0	113.5
Italy			69.4	71.6	66.7	72.8	71.9	74.7	70.9	71.3	79.5	96.0	97.7
Japan			112.5	111.9	101.2	94.6	103.1	112.9	121.3	129.7	133.9	132.4	126.5
Netherlands			108.6	106.6	95.2	89.3	93.5	85.4	86.8	86.7	82.1	66.7	69.2
Sweden			93.1	90.0	96.0	101.1	97.8	90.9	84.9	86.7	89.0	90.3	96.8
U.K.			106.4	102.9	110.3	117.1	106.6	101.5	100.0	92.9	99.4	103.3	110.5
U.S.A.			107.9	107.4	109.4	106.5	113.1	114.4	102.2	102.5	98.7	106.4	106.7

Source: Science, Technology and Industry Indicators, Volume E: Competitive Position Indicators of Manufacturing Industries, DSTI/SPR/85.4, OECD, Paris, 25 March 1985.

TABLE 17. Canadian Production of "High-technology" Industries

Industry	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
	millions of current U.S. dollars												
Electronic components	892	910	1071	1242	1592	1653	1710	1571	1564	1838	2119		
Drugs and medicines	331	384	418	465	534	579	639	644	719	792	866		
Scientific instruments	387	442	507	572	682	750	859	887	960	1077	1151		
Electrical machinery	1392	1539	1649	1872	2350	2417	2629	2579	2750	3292	3784		
Aerospace	521	477	494	540	637	699	737	698	928	1239	1367		

Source: Science, Technology and Industry Indicators, Volume E: Competitive Position Indicators of Manufacturing Industries, DSTI/SPR/85.4, OECD, Paris, 25 March 1985.

TABLE 18. Canadian Export Share of Production of "High-technology" Industries

Industry	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
	percentage												
Electronic components	27.0	25.8	22.5	26.5	25.3	24.2	26.7	27.4	29.0	34.5	38.4		
Drugs and medicines	9.6	8.3	9.1	10.0	9.6	9.2	8.3	10.5	8.8	9.6	11.1		
Scientific instruments	35.8	29.3	28.3	31.1	28.5	30.4	29.0	27.7	31.7	41.1	47.0		
Electrical machinery	11.4	8.8	9.0	8.1	8.8	8.6	8.1	8.9	9.8	12.3	11.8		
Aerospace	78.9	76.5	104.3	84.6	79.4	70.0	71.9	80.0	41.1	46.5	62.6		

Source: Science, Technology and Industry Indicators, Volume E: Competitive Position Indicators of Manufacturing Industries, DSTI/SPR/85.4, OECD, Paris, 25 March 1985.

TABLE 19. Comparative Advantage Indicators for Canadian "High-technology" Industries

Industry	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
	percentage												
Electronic components			36.0	41.1	45.8	45.0	35.5	31.0	39.9	36.7	41.0	50.9	49.5
Drugs and medicines			22.8	23.7	23.6	24.0	19.8	22.6	18.0	18.6	20.7	24.4	19.1
Scientific instruments			33.9	35.8	34.0	38.2	33.3	27.7	29.0	35.4	38.3	37.7	42.2
Electrical machinery			29.1	25.3	26.6	27.4	21.8	19.5	20.3	26.9	26.9	26.7	25.6
Aerospace			125.9	97.0	94.5	87.2	81.0	85.1	47.1	53.8	65.5	64.4	75.7

Source: Science, Technology and Industry Indicators, Volume E: Competitive Position Indicators of Manufacturing Industries, DSTI/SPR/85.4, OECD, Paris, 25 March 1985.

TABLE 20. Import Penetration of Canadian "High-technology" Industries

Industry	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
	percentage												
Electronic components	36.7	40.8	44.2	47.3	45.3	41.3	48.0	51.8	54.0	58.3	59.6		
Drugs and medicines	21.3	18.1	19.6	20.4	23.0	23.5	22.9	26.5	22.6	25.2	26.6		
Scientific instruments	63.7	58.9	59.2	62.0	61.8	61.3	60.0	61.5	64.3	69.6	73.9		
Electrical machinery	23.2	24.9	26.1	26.3	26.5	27.7	29.6	30.2	31.5	32.1	28.8		
Aerospace	77.0	71.9	107.6	86.8	84.0	76.2	67.1	75.0	54.3	63.7	75.1		

Source: Science, Technology and Industry Indicators, Volume E: Competitive Position Indicators of Manufacturing Industries, DSTI/SPR/85.4, OECD, Paris, 25 March 1985.